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Perception of altered gingival aesthetics among orthodontists and dental students

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Abstract

Introduction: High smile line can make smile unattractive. Aim of current study was to measure the mean attractiveness score of smile at altered gingival show levels as perceived by orthodontists and dental students.

Material & Methods: This cross sectional survey was conducted at de'Montmorency College of Dentistry, Pakistan. A constructed smiling photograph of a female having pleasing smile was edited using Adobe Photoshop software in order to modify gingival show in ±1 mm increment to produce 11 smile pictures, from −5 to 5mm gingival show. Visual analogue scale (VAS) was used by 100 participants (50 orthodontists and 50 dental students) to rank the smile attractiveness.

Results: Except for 0mm gingival show, significant smile perception differences were found among the orthodontists and dental students for all the other levels of gingival show.

Conclusions: The smile with 0 mm of gingiva was considered to be the most attractive by both orthodontists and dental students.

Keywords: Gummy smile; smile aesthetic; attractiveness; perception.

Introduction

Nowadays orthodontic patients are very concerned about their facial and smile aesthetics, which are key in composition of one's overall beauty.[1, 2] Smile plays a key role in determining individuals' first impression,[3] and also have a impact on social communication and personality development[4]. Psychosocial well-being is also found to be positively related to pleasant smile aesthetics.[5]

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There are various determinants of smile esthetic such as tooth color, size and shape, smile arc, gingival show, gingival heights, midlines, buccal corridors, incisal edge discrepancy, bite depth, occlusal cant, and many others.[6-8] There are also various factors that influence gingival show including, vertical maxillary excess, upper lip hyperactivity, upper lip length, and incisal crown height.[9-11]

There are three types of smile lines:[10] a high smile line (gummy smile), where the maxillary incisors clinical crowns were 100% exposed and some amount of gingiva was visible; an average smile, 75–100% of the upper incisors visible; and when less than 75% of the crown is displayed it is called a low smile line. According to evidence, pleasing smile is one in which maxillary incisal show is 100% along with 1-3 mm of gingival show. [12-13]

Various studies have been conducted to establish a relationship between altered gingival show and smile aesthetics. Kokich[14]

found that esthetically acceptable threshold of gingival show for dentists were 4 mm and for orthodontists it was 2 mm. In another study it was found that for orthodontists' smile scores were most aesthetic at -1mm and 0mm and for dental students scores were most aesthetic at -2mm and -1mm.[4]

As these studies were conducted in developed western countries, but there has been no scientific evidence to support same results in the Asian population, particularly in the Pakistani subjects. Therefore, objective of current study was to involve orthodontists, and dental students to measure the effect of different levels of gingival shows on their smile perception.

Material and Methods

Current cross sectional study was conducted at de'Montmorency College of Dentistry, Pakistan. Sample size of 100 was calculated with 95% confidence level, d=1 and taking expected mean ± Standard deviation of 8.39 ± 4.195 for smile score with gingival show of '0 mm' by orthodontists.[4]

Patients were selected as per following criteria: BDS dental students, orthodontists who have completed at least 1 year of postgraduate training, participants of both genders, age 18-30 years, participants having good eyesight, and participants who are willing to participate.

After institutional ethics approval and informed consent, 50 dental students and 50 orthodontists was selected and demographic information like name, age, and gender was obtained. A constructed smiling photograph of a female having pleasing smile was edited using Adobe Photoshop software in order to modify gingival show in 1 mm increments up to ±5mm, to get 11 pictures.[4] Here positive is excessive and negative mean inadequate gummy smile. Questionnaire was provided randomly to the participants along with 11 pictures and VAS grading scale (1 being least attractive and 10 being most), to score the smile attractiveness**.** All the evaluators were advised not to compare the images and the evaluation time for each image was limited to 60 seconds.

15 randomly selected participants from each group and were asked to re-evaluate the11 images to determine the reliability. Paired sample tests showed that there was no method error in ranking smile esthetics.

Quantitative data like age and smile attractiveness score with different gingival show (-5mm, -4mm, -3mm, -2mm, -1mm, 0mm, +1mm, +2mm, +3mm, +4mm, +5mm) was presented in the form of mean ± standard deviation.

Frequency and percentages was calculated for gender, and year of training/educational level to address the effect modifier. Data was stratified for ages, gender, and year of training. Post stratification student t-test was applied to check the significance.

Results

The mean age of the participants was 24.34±3.84 years (Table I). The mean age of the dental students group was 21.06±1.27 years and of orthodontist group were 27.62±2.49 years (Table II).

45(45%) were male and the female were 55(55%) with male to female ratio of 0.8:1 (Figure 1), out of 45 males, 21 were from dental student group and 24 from orthodontist group, similarly females were 55, out of which 29 were from dental students group and 26 from orthodontist group (Table III).

Except for 0 mm gingival show statistically significant difference was found between the two groups for gingival show of -5mm, -4mm, -3mm, -2mm, -1mm, +1mm, +2mm, +3mm, +4mm, +5mm (Table IV & V).

The study results after stratification by gender showed that statistically significant difference was noted between all the gingival displays except for 0 mm (Table VI).

Table I: Descriptive statistics of age (years)

Age (years)	n	100
	Mean	24.34
	SD	3.84
	Minimum	19
	Maximum	37

Table II: Comparison of age in two groups

		Level	
		Dental student	Orthodontist
Age (years)	N	50	50
	Mean	21.06	27.62
	SD	1.27	2.49

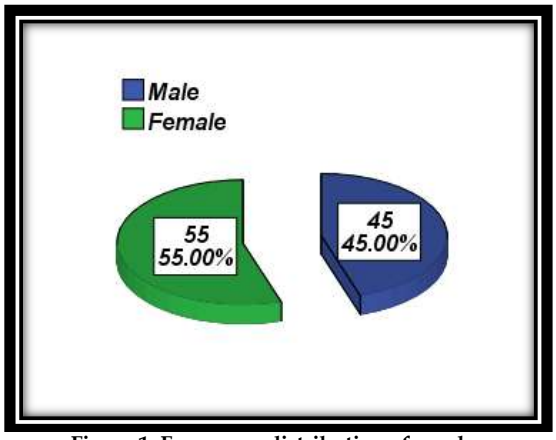

Figure 1: Frequency distribution of gender

Table III: Comparison of gender in two groups

		Level		Total
		Dental student	Orthodontist	
Gender	Male	21	24	45
	Female	29	26	55
Total		50	50	100

Table IV: Comparison of negative gingival show score in two groups

		Score			p-value
Gingival displays	Level	n	Mean	SD	
-5 mm	Dental student	50	3.12	0.895	0.000
	Orthodontist	50	2.42	0.499	
-4 mm	Dental student	50	4.68	1.077	0.000
	Orthodontist	50	3.58	0.499	
-3 mm	Dental student	50	5.46	0.706	0.000
	Orthodontist	50	4.38	0.490	
-2 mm	Dental student	50	6.04	0.727	0.000
	Orthodontist	50	5.48	0.646	
-1 mm	Dental student	50	6.82	0.596	0.032
	Orthodontist	50	7.12	0.773	
0 mm	Dental student	50	8.22	1.02	0.085
	Orthodontist	50	8.62	0.60	

Table V: Comparison of positive gingival show score in two groups

		Score			p-value
Gingival displays	Level	n	Mean	SD	
1 mm	Dental student	50	6.82	0.59	0.032
	Orthodontist	50	7.12	0.77	
2 mm	Dental student	50	6.04	0.73	0.000
	Orthodontist	50	5.48	0.64	
3 mm	Dental student	50	5.46	0.71	0.000
	Orthodontist	50	4.38	0.49	
4 mm	Dental student	50	4.68	1.07	0.000
	Orthodontist	50	3.58	0.49	
5 mm	Dental student	50	3.12	0.89	0.000
	Orthodontist	50	2.42	0.49	

Table VI: Comparison of overall gingival displays scores in two groups

		Level		p-value
Gingival displays	Gender	Dental student	Orthodontist	
-5 mm	Male	3.29±0.96	2.54±0.51	0.002
	Female	3.00±0.84	2.31±0.47	0.001
-4 mm	Male	4.71±0.90	3.67±0.48	0.000
	Female	4.66±1.20	3.50±0.51	0.000
-3 mm	Male	5.33±0.66	4.54±0.51	0.000
	Female	5.55±0.74	4.23±0.43	0.000
-2 mm	Male	5.95±0.86	5.63±0.57	0.000
	Female	6.10±0.62	5.35±0.68	0.000
-1 mm	Male	6.67±0.48	7.17±0.82	0.018
	Female	6.93±0.65	7.08±0.744	0.011
0 mm	Male	8.67±0.97	8.50±0.66	0.498
	Female	7.90±0.94	8.73±0.533	0.421
1 mm	Male	6.67±0.48	7.17±0.82	0.018
	Female	6.93±0.651	7.08±0.744	0.011
2 mm	Male	5.95±0.86	5.63±0.57	0.018
	Female	6.10±0.62	5.35±0.69	0.000
3 mm	Male	5.33±0.66	4.54±0.51	0.000
	Female	5.55±0.74	4.23±0.43	0.000
4 mm	Male	4.71±0.90	3.67±0.48	0.000
	Female	4.66±1.20	3.50±0.51	0.000
5 mm	Male	3.29±0.96	2.54±0.51	0.002
	Female	3.00±0.84	2.31±0.47	0.001

Discussion

According to literature, perfect smile is one in which upper lip is located in such a way that the whole of upper incisors and 1 mm of the gingiva is visible. However, it is noteworthy that even if the gingival display is up to 3mm, it is still considered esthetically adequate.[15] Assessment of perception of smile esthetics of dentists, orthodontists and laypersons had been investigated in the literature under varying methodologies and results. [14,16-19] Objective of current study was to involve Pakistani orthodontists, and dental students to see the effect of different levels of gingival shows on their smile perception.

In our study insignificant difference was noted at 0 mm gingival displays between the dental students and orthodontists. In comparison with other studies, a study was performed in 2010 showed that for orthodontists, score at 0 mm gingival show was most aesthetic with mean value of 8.39±4.195 and +5mm gingival show was least aesthetic, while for dental students score were most esthetic at -2mm and +5mm was least aesthetic.[4] In contrast, Kokich[14] concluded that esthetically acceptable value of gingival show for dentists were up to 4 mm and for orthodontists it was 2 mm.

Our study showed that dental students were less tolerant to altered gingival show than orthodontists. Results are similar to study by Hanan[20] who showed that dental students were more sensitive to changes in gingival display than pharmacy students. A study by Larissa Suzuki[21] demonstrated that laypersons were statistically more accepting of altered gingival levels than the orthodontists.

Our study showed that gingival show had statistically significant influences on the perception of smile attractiveness , which is similar to findings of Kaya B[22] concluded that both smile arc ($P < 0.05$) and gingival display amount ($P < 0.001$) had statistically significant influences on the perception of smile attractiveness.

The study results showed that statistically significant difference was noted between the gingival displays of -5 mm, -4 mm, -3 mm, 3 mm, 4 mm, and 5 mm with level of student stratified by gender, this is similar to findings of Geron and Atalia,[23] but in contrast to findings of Hideki Ioi,[4] where no gender differences were found in smile perception as per gingival show alteration.

In present study, the smile attractiveness at altered gingival show from 5 mm to -5 mm were compared, this wide range was sufficient for comparison with available data. This is in contrast to previous studies that evaluated same from −2 to 4 mm in a study by Hunt *et al.* [15] or −4.6 to 3.3 mm in a study by Geron and Atalia. [23]

Orthodontists should remember that according to the current study, Pakistanis young might consider even 1 mm gummy smile to be unpleasant and might not be satisfied with their results if gingival show remains after orthodontic therapy.

The perception of laypersons in evaluating gum show may be different from that of orthodontists so further research that includes laypersons is suggested. Furthermore other aspects of smile aesthetics such as midlines, gingival heights have gained attention,[24-27] so influence of these factors on smile aesthetics in Pakistanis should be investigated.

Conclusions

- Mean attractiveness score of smile with altered gingival show was significantly different as perceived by dental students and orthodontists except at 0 mm level.
- The smile with 0 mm of gingiva was considered to be the most attractive by both orthodontists and dental students.

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