

# Evaluation of smile esthetics in terms of midline diastema by dental students

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## Abstract

**Introduction:** The relationship of teeth with each other as well as with the surrounding soft tissues has a strong impact on smile esthetics. The aim of this study was to quantify the ideal and the maximum acceptable variation in smile esthetics with specific regard to midline diastema.

**Material and Methods:** A frontal smiling photograph of a female subject having no midline diastema was modified by increasing the midline diastema in 0.5 mm increments. In this way, 4 photographs with midline diastema of 0.5 mm, 1 mm, 1.5 mm and 2 mm were obtained. These 5 photographs including one standard and four modified were shown to 128 participants selected according to the inclusion criteria. The participants were asked to rate the overall smile in each of the photographs using visual analogue scale (VAS).

**Results:** No significant difference was observed for both groups for the most preferred and least preferred smile ( $p > 0.5$ ). Both the 1<sup>st</sup> year group and the Final year group rated the smile without any midline diastema as the highest. The Final year group gave an overall higher mean score as compared to the 1<sup>st</sup> year group.

**Conclusions:** The 1<sup>st</sup> year and final year students prefer smiles with no midline diastema and they rate a large midline diastema as unattractive.

**Keywords:** Smile evaluation; visual analogue scale; orthodontics

## Introduction

The purpose of orthodontic treatment is not only to address functional problems but also to enhance esthetics and appreciation of differences between perceptions of lay people and professionals.<sup>1</sup> Smile esthetics have a profound influence on an individual's wellbeing, as patients have a strong desire to be seen beautiful by themselves as well as socially.<sup>2</sup> This has been attributed to the fact that during our social gatherings, face is the focus of attention and source of communication.<sup>3</sup>

For an attractive smile, it is a prerequisite that all structures including hard and soft tissues are in harmony.<sup>4</sup> Not only does the buccal

corridor width, gingival margins, dental midline, smile arc, tooth and gingival show during smile contribute to the smile esthetics but also the midline diastema and crown lengths have a key role.<sup>5,6</sup>

Numerous studies have been conducted to compare the difference in perception among dental students. Pilar Espana concluded that, no significant difference in perception regarding the midline diastema existed between dental students.<sup>7</sup> A midline diastema of 1mm was given a mean score of  $4.78 \pm 1.52$  by 1<sup>st</sup> year students and  $4.10 \pm 1.95$  by the Final year students. A midline diastema of 1.5mm was given a mean score of  $4.00 \pm 1.46$  by the 1<sup>st</sup> year students and  $3.41 \pm 1.82$  by the Final year students.

There are very few studies regarding the assessment of smile esthetics amongst the dental students in Pakistan.<sup>7,8</sup> Therefore, the purpose of this study was to assess the influence of studying the subject of Orthodontics on the evaluation of smile esthetics by dental students.

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## Material and Methods

After approval from the ethical committee of Islamic International Dental Hospital, frontal smiling photograph of a female subject having appropriate vertical dimensions of the maxillary anterior teeth and no midline diastema was modified by using Adobe Photoshop 7.0 (San Jose, California, USA) by increasing the midline diastema in 0.5 mm increments. In this way 4 photographs with midline diastema of 0.5mm, 1mm, 1.5 and 2mm were obtained.

Of the 128 participants 28.1% were male and 71.9% were female. The 128 respondents were divided into two groups of first and final year students. Out of the 1<sup>st</sup> year students group (N=63) 31.7% were males and 68.3% were females. In the Final year group, out of the total 65, 24.6% were males and 75.4% were females. The mean age of 1<sup>st</sup> year group was  $19.11 \pm 0.785$  and the mean age of Final year group was  $22.75 \pm 0.791$ . Undergraduate dental students in First year who had not studied Orthodontics, Undergraduate dental students in their Final year who had studied Orthodontics for a minimum period of six months between ages of 18 to 25 years irrespective of their gender were included in the study sample. Graduates and those who had received orthodontic treatments and in 2<sup>nd</sup> and 3<sup>rd</sup> year of their education were excluded from the study.

The 5 photographs including one standard and four modified were shown to 128 participants, selected according to the inclusion criteria, on a power point (Microsoft Power Point Version 2010) presentation using a projector (Philips multimedia projector, Amsterdam, the Netherlands). Each photograph was displayed for 30 seconds. The participants were asked to fill up a proforma and mention their age and study year and rate the overall smile in each of the photographs using visual analogue scale (VAS) that ranged from 0 to 10 (0 = worst; 10 = very good).

Data analysis was performed using Statistical Package for the Social Sciences (SPSS version

16.0, Chicago, SPSS Inc). Frequencies and percentages were presented for gender and age of the students. Means and standard deviations were obtained for all the numerical variables i.e. age of the respondents and score for midline diastemas and crown heights. Effect modifiers such as age and gender were controlled by stratification. Post stratification independent sample t-test was applied to compare the mean VAS for 1<sup>st</sup> year and Final year group. The *p* value less than 0.05 was considered as statistically significant.

## Results

Table I shows the mean values given by 1<sup>st</sup> year group for the midline diastema. The highest score was given to slide A having the smile with no midline diastema. The least score was given to slide E having the midline diastema of 2mm.

Table II shows the mean score for midline diastemas given by final year students. The highest score was given to Slide A having smile with no midline diastema. The least score was given to slide E having the smile with midline diastema of 2mm.

**Table I: Mean VAS Score for Midline Diastema by 1<sup>st</sup> year**

Variable	N	Mean	Std. Deviation	Std.Error Mean
Slide 1A: MD 0	63	7.94	1.512	.190
Slide 1B: MD 0.5mm	63	5.84	1.816	.229
Slide 1C: MD 1mm	63	4.98	1.963	.247
Slide 1D: MD 1.5mm	63	4.19	2.109	.266
Slide 1E: MD 2mm	63	4.10	5.512	.694

**Table II: Mean Vas Score For Midline Diastema By Final Year**

Variable	N	Mean	Std. Deviation	Std.Error Mean
Slide 1A: MD 0	65	8.02	1.700	.211
Slide 1B: MD 0.5mm	65	6.46	1.621	.201
Slide 1C: MD 1mm	65	5.52	1.659	.206
Slide 1D: MD 1.5mm	65	4.75	1.572	.195
Slide 1E: MD 2mm	65	3.82	1.619	.201

**Table III: T-Test for equality of Means for Midline Diastema**

Variable	Mean Difference	Std. Error Difference	P value*	Significance
Slide 1A: MD 0	-.079	.285	.263	NS
Slide 1B: MD 0.5 mm	-.620	.304	.778	NS
Slide 1C: MD 1mm	-.539	.321	.543	NS
Slide 1D: MD 1.5mm	-.563	.36749	.024	S
Slide 1E: MD 2mm	.280	1.12345	.135	NS

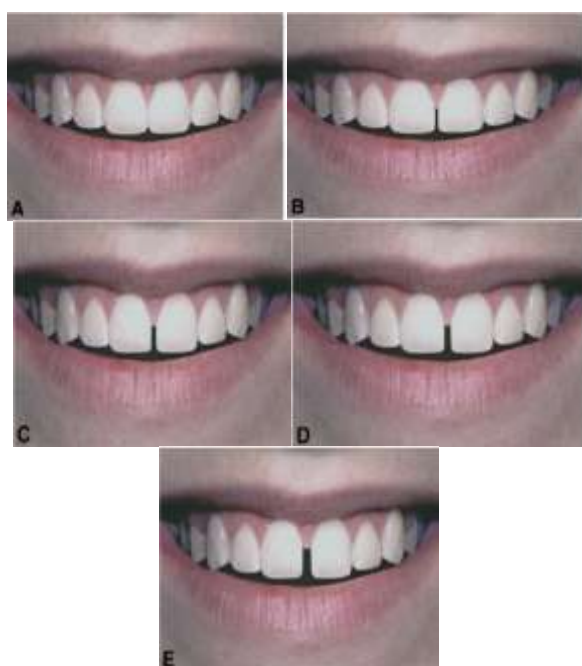
**Figure 1:  
Group 1: Midline Diastema Variations**

Table III shows the results for comparison between the 1<sup>st</sup> year and final year group for midline diastema. No significant difference was observed for both groups for the most preferred and least preferred smile ( $p > 0.5$ ). Both 1<sup>st</sup> and final year group rated the smile without any midline diastema (Slide A) as the highest. The final year group gave an overall higher mean score as compared to the 1<sup>st</sup> year group. Significant difference was found only for Slide D ( $p = 0.024$ ) having smile with midline diastema 1.5 mm.

## Discussion

Facial and dental esthetics makes an impact on peoples' lives and hence it has an enormous importance in our society. This is because facial attractiveness is a factor of interest to everyone as it relates to their social as well as professional interactions. The primary goal of orthodontics is to improve dental esthetics and perception of esthetics despite the fact that that beauty is highly subjective. Although a controversy exists regarding the long term benefits of orthodontic treatment on dental health, occlusal function and its stability, a constant desire among the adolescents and the adults to consider undergoing orthodontic treatment to improve their dental appearance has been well documented.

It is essential to control the ways orthodontic treatment affects dento-facial esthetics. This can be achieved if one understands the principles that govern the balance between teeth and oral soft tissues when a person smiles and what constitutes a symmetrical smile. There are many studies in the literature where perception of smile esthetics among non-dental professionals has been analyzed. Regarding the perception of smile esthetics in dentistry, students and future dental professionals; it was found in one study that compared the dentistry students of different study years. Similarly, one study compared dental students with a group of orthodontists. Moreover, we did not find any study on Pakistani dental students. Therefore, the aim of the present study was to determine a significant difference in perception of smile esthetics in terms of midline diastema between the 1<sup>st</sup> and final year dental students. Midline diastema is defined as the space or gap between maxillary central incisors. The space can be a normal growth characteristic during deciduous and mixed dentition stages and is normally closed by the time the maxillary permanent canines erupt. If it persists beyond that stage, it needs to be closed by means of orthodontic treatment. It

is important to know if and how changes in the dimension of midline diastema affects facial attractiveness. Studies show the absence of midline diastema to be most attractive during smile. In order to provide useful clinical and academic guidelines, it is important to determine whether dental students of different study years perceive midline diastemas of varying sizes differently.

Both the groups of students were shown the same set of photographs. There were 128 respondents that were divided into two groups. Group 1 consisted of 1<sup>st</sup> year dentistry students who were not familiar with the subject of Orthodontics. The group 2 included Final year dentistry students who had studied the subject of orthodontics for a minimum period of 6 months.

The visual analogue scale was used to judge attractiveness in an efficient and simplified manner. A continuous scale was used rather than restricting the respondents to categories.<sup>9</sup> Because the scale may mean different things to different raters, all responses may not be equal, to overcome these limitation, the scale was defined i.e. the scale ranged from 1 to 10 with 1 being least attractive and 10 most attractive.

The results in this study show that both 1<sup>st</sup> and final year students preferred the smile without any midline diastema. This was in accordance with that of Espana et al.<sup>7</sup> Both the groups rated an overall highest score to slide A which had a smile without a midline diastema. On comparing both groups, final year group gave an overall higher score to all slides from A to E as compared to 1<sup>st</sup> year group, but the difference between these scores was statistically insignificant except for slide D where the score given by final year group was significantly greater than that given by the 1<sup>st</sup> year group.

The results of this study contrast with those of Kokich et al where image of a smile was sequentially altered with the help of a software imaging program.<sup>10</sup> The alterations

performed in the original image included crown length, width, midline diastema, height of the papilla and relationship of the lip to the gingiva of the maxillary anterior teeth. These modified images were rated by the respondents using a visual analogue scale. None of the groups in the study rated a small midline diastema as unattractive.

A similar study to evaluate the effects of crown height, crown width and midline diastema on the smile esthetics was carried out by Thomas et al.<sup>11</sup> Three images of smiles were intentionally altered with a software imaging program. A small midline diastema was not rated as unattractive by any group of raters.

In a study by Nocqueira et al, the esthetic perception of some components of smile including the length of crown and the maxillary midline diastema was evaluated.<sup>12</sup> The raters were asked to assess the esthetics of 13 altered pictures of same smile arranged at random. The classification of the modified photographs was done using visual analogue scale ranging from 1 to 10. Midline diastemas were considered among the least esthetic smile components.

There are few studies of smile characteristics that have used a full face perspective. An acceptable range of smile variables might be broader when a full face perspective is used because evidence has shown that other aspects of the face are more important to people than smile when evaluating facial esthetics.<sup>13</sup> This would mimic views involved in normal conversation in contrast to lower face view. This wider perspective could result in dilution of the attention to details of the smile. Indeed, that can be seen in study carried out by Flores-Mir et al. in which anterior dental occlusion had less esthetic impact in the full face view compared to the dental or circum-oral views.<sup>14</sup> A significant variation by patient, which was most likely their facial appearance, has been demonstrated in this study.<sup>15</sup> There is ample evidence that gender and age of the rater do not influence ratings of esthetics.<sup>16, 17</sup>

The specific aim of this research was to quantify smile variables from dental students' perspective and to assess the influence of studying the subject of Orthodontics on the evaluation of smile esthetics by the dental students. Although both the 1<sup>st</sup> and final year students had similar tendencies for rating the variations in midline diastemas, final year students were overall more generous in rating all the photographs. Since the sequence of the photographs was not randomized, it is possible that an order effect may be present. This could have been controlled by randomizing the order for each judge, which is feasible if an automated survey is used.

## Conclusions

1. The 1<sup>st</sup> and final year students prefer smiles with no midline diastema.
2. A large midline diastema in the maxillary dentition is rated as unattractive by 1<sup>st</sup> and final year students.

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