Evaluation Esthetics Smile for Male and Female who attend to Outpatient clinic in Babylon Dental College.

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Abstract

Objective: The current investigation was proposed to determine the analysis smile esthetics for male and female who attended to outpatient clinic in Babylon Dental College.

Materials and Methods: Twenty-six samples ideal images were used in a survey and graded according to smile attractiveness by the male (n = 35) and female (n = 47) all groups with age (30-35). Ideal photographs of gingival display, midline diastema, central incisor crown length, and lateral incisor crown width were manipulated with five minor changes in each. For smile arc and buccal corridor, two major changes were incorporated besides the ideal photograph. One-way ANOVA and Post Hoc analysis (Bonferroni method) of the responses were measured for each group.

Results: this study found that the smile in male category was the more variations in the smile arc and buccal corridors, with either 0.5 mm of alterations or completes absence in a gingival display. The female were more in variables like buccal corridor, Gummy smile and Lateral incisor crown width. Changes in lateral incisor crown width were not perceivable by the two groups.

Conclusion: The degree of perception of smile esthetics to be attractive varies between male and female. The female were more in variables like buccal corridor, gummy smile and lateral incisor crown width. However, some of other variables did not affect the male and female much, with conditions of this study the result showed, the esthetic dentists to be more conscious about alterations in elements which used in this study, each representing an altered smile feature in their smile. Hence, to pay attention to these factors during any esthetic treatment.

Keywords: smile esthetics, analysis, buccal corridors, smile arc, buccal corridor

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1. Introduction:

All humans' desire esthetically pleasing features and the smile is one of the most sought features. Numerous studies have concluded that male and female differ considerably in their smile esthetics [4, 5]. Smile analysis is an integral part of the overall facial analysis carried out by dental specialties. Assessing patient’s smile allows the clinician to see what needs to be done, what can be done, and what should be accepted. A smile analysis includes assess in the amount of the incisors and gingiva show upon smiling, the smile arc (parallelism between the maxillary incisal edges and the lower lip), tooth proportions, gingival height and contours, relationship between the dentalmidline and facial midline, and tooth shade and color [1]. An esthetically pleasing smile is dependent on the harmony andsymmetry between these variables. Currently, the demand for smile esthetics is growing; being thus, various smile variables need to be taken into consideration [2]. The perception of smile esthetics is subjective and is influenced by personal experiences and social environment [3].

A smile which appears beautiful in the first instance might not be in the second instance. This plays a significant role in determining the threshold level of acceptable deviations in different variables responsible for making a smile pleasing and attractive. Most of the studies assessing the smile esthetics have assessed the variables only once and have determined the threshold levels based on them [6–10]. This might not be the true representation of the threshold. Hence, scoring the same smile variable more than once might show the actual threshold level.

The present study aimed at:
1-evaluating the differences in perceiving factors that affect the smile esthetics, among male, female.
2-testing the hypotheses that, male are more than female effecting in esthetic smile factors.
2. Materials and Methods:
This study was done as prospective clinical study in male and female who attend to outpatient clinic in Babylon Dental College, with approval of University Ethical Committee (reference No. #3554).

2.1. Samples:
In a cross-sectional study, a total of 82 samples participated, including 35 male with a mean age of 30 ± 5 years, and the 47 female groups had a mean age of 30 ± 5 years, and those with dental prosthesis were excluded.

2.2. Variables and Measurements:
The samples of female and male groups examined and valued six different esthetic variables to test our hypotheses. The photographs showed:
1- The smile alone.
2- Excluding other facial structures.
3- To minimize any confounding factors.

Moreover, the smile features in the photographs were digitally modified by Adobe Photoshop software (Adobe Systems Inc., San Jose, CA), the modifications were purposely created to resemble a smileesthetic variation. After alteration, the images were condensed or enlarged to achieve an image size that represented the actual tooth size.

A total of twenty-six digital photographs were used in this study. The photographs were grouped into six sets, each representing an altered smile feature. The altered features wereas follows:

- Smile arc
- Buccal corridor
- Gingival display (gummy smile)
- Midline diastema
- Central incisor crown length
- Lateral incisor crown width

The changes were made incrementally. Photographs of gingival display, midline diastema, central incisor crown length, and lateral incisor crown width were manipulated with five minor changes in each and were evaluated twice. For smile arc and buccal corridor, two major changes were incorporated besides the ideal photograph and were measured only once. Two of the six (central incisor crown length, lateral incisor crown width without altering the crown length) were modified asymmetrically.

2.2.1. Smile Arc: The photograph was modified by reversing and accentuating the curvature of the anterior teeth in relation to the curvature of the lower lip (see Figure 1).

![Figure 1: Illustration of alterations in the smile arc.](image)

<table>
<thead>
<tr>
<th>Smile Arc</th>
<th>A</th>
<th>B</th>
<th>C</th>
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2.2.2. Buccal Corridor: The photograph was modified between the buccal surfaces of the maxillary teeth and the corners of the mouth (see Figure 2).
2.2.3. **Gingivato lip distance:** The gingivatolip margin level was increased by 1 mm, to create a “gummy” smile. Modifications were based on the relationship of the upper lip with the gingival margin of the maxillary incisors (Figure 3).

Figure 3: Photographs elucidating gingival display on the smile. Gummy smile images were obtained by an incremental raise in the gingival-lip relationship. (A) Control, (B) 1 mm, (C) 2 mm, (D) 3 mm, and (E) 4 mm.

<table>
<thead>
<tr>
<th>Gingiva to lip distance</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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2.2.4. **Midline Diastema:** A midline diastema was introduced between the maxillary central incisors by a 0.5 mm increment measured from interproximal contact point of the central incisors (Figure 4).

Figure 4: Photographs demonstrating modifications of a midline diastema. The alterations were done by an increment of 0.5 mm. (A) No alteration (control), (B) 0.5 mm midline diastema, (C) 1 mm diastema, (D) 1.5 mm diastema, and (E) 2 mm diastema.

<table>
<thead>
<tr>
<th>Midline Diastema</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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2.2.5. **Crown Length:** The central incisor crown length of the maxillary left central incisor was altered by adjusting the level of the gingival margin, thereby shortening the length of the crown, in 0.5 mm increments. The reference point used for these adjustments was...
measurements was the most superior point on the labial gingival margin of the patient’s adjacent central incisor. The most common variation in lateral incisor crown width is usually associated with the size of the maxillary lateral incisors; hence, the alterations of lateral incisor crown width were made to the maxillary lateral incisor (Figure 5).

![Figure 5: Photographs showing changes to the crown length of the maxillary left central incisors. Shortening of Central incisor crown length was achieved by reducing the gingival margin height by 0.5 mm increments. (A) Control, (B) 0.5 mm, (C) 1.0 mm, (D) 1.5 mm, and (E) 2.0 mm.](image)

### 2.2.6. Lateral incisor crown width:
Symmetrical crown width alterations were made to the maxillary lateral incisors. The incisal edge was kept at the same level. The alteration was limited to the mesio-distal width of the lateral incisors, which was decreased by 1 mm (Figure 6).

![Figure 6: Photographs displaying alterations to maxillary lateral incisors crown width. Gingival margin maintained the same level, but the width of the maxillary right lateral incisors crown was decreased by an increment of 1 mm. (A) Control, (B) 1 mm, (C) 2 mm, (D) 3 mm, and (E) 4 mm, decrease in the width of the maxillary lateral incisors.](image)

### Statistical Analyses:
Data analysis was undertaken using the Statistical Package for Social Science (version 15.0, SPSS Inc., Chicago, Illinois, USA). The mean Visual Analog Scale (VAS) scores and standard deviation (SD) of each group were calculated. One way analysis of variance (ANOVA) test was conducted within each group to assess how the groups rated each level of deviation. Significant overall tests were followed by a series of post hoc multiple comparisons (Bonferroni method) to test hypotheses 1 and 2, and was used to detect any significance level between the two closely related male and female, which is more conservative. The level of significance was set at \( p < 0.05 \).

### Results:
The mean scores of the photographs were evaluated, and the difference was calculated by using analysis of variance (ANOVA).

The mean VAS scores for gummy smile, midline diastema, crown length, and lateral incisor crown width by one-way ANOVA demonstrated \( p \) value less than 0.05 for all the variables except lateral incisor crown width (Table 1).
Bonferroni method in table (2), this indicates no effect of all the smile variables except lateral incisor crown width and Gummy smile varies significantly among the two groups. The alterations in lateral incisor crown width affect the attractiveness of the smile for male and female.

3.1. Smile Arc: Analyses of VAS scores for smile arc revealed that the male smile arc (Figure 1(b)) is the most seen. A significant mean value for male (2.30) and female (2.64) had also rated the ideal smile arc as their most preferred one. Next to ideal smile arc, the male had more (Figure 1a) over flat smile arc (Figure 1c). Similarly, females also had more smile arc over flat one. However, males were less critical in effect deviations in the smile arc than females. On multiple comparison by one-way ANOVA within each group (p = 0.000), a significant difference between male and female (Table 1). The analysis strongly supported our hypothesis which states that the male are more critical in smile aesthetics than females in this study. Analysis by Bonferroni’s test revealed the significant difference that exists between the male and female (p = 0.008) as shown in table 2.

<table>
<thead>
<tr>
<th>Smile variables</th>
<th>Male mean ± SD (n = 35)</th>
<th>Female mean ± SD (n = 47)</th>
<th>F value*</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smile arc</td>
<td>2.09 ± 0.926</td>
<td>2.64 ± 0.791</td>
<td>8.602</td>
<td>0.000***</td>
</tr>
<tr>
<td>Buccal corridor</td>
<td>0.91 ± 0.943</td>
<td>0.83 ± 0.225</td>
<td>17.506</td>
<td>0.473</td>
</tr>
<tr>
<td>Gummy smile</td>
<td>2.05 ± 0.640</td>
<td>2.89 ± 0.242</td>
<td>8.857</td>
<td>0.000***</td>
</tr>
<tr>
<td>Midline diastema</td>
<td>2.17 ± 0.347</td>
<td>2.29 ± 0.638</td>
<td>1.431</td>
<td>0.072</td>
</tr>
<tr>
<td>Central incisor crown length</td>
<td>2.34 ± 0.270</td>
<td>2.48 ± 0.970</td>
<td>2.087</td>
<td>0.138</td>
</tr>
<tr>
<td>Lateral incisor crown width</td>
<td>2.48 ± 0.380</td>
<td>2.72 ± 0.030</td>
<td>1.322</td>
<td>0.022*</td>
</tr>
</tbody>
</table>

SD: standard deviations, * one-way ANOVA, ** p ≤ 0.05, and *** p ≤ 0.001.

3.2. Buccal Corridors: The male preferred mean value (0.91) (Figure 2c), followed by ideal Buccal corridor (0.83) for females (Figure 2b). Analysis by one-way ANOVA revealed no significant difference that exists between the male and female within each group (p = 0.473) as shown in (table 1). Analysis by Bonferroni’s test revealed no significant difference that exists between the male and female (p = 0.927) as shown in table 2.

<table>
<thead>
<tr>
<th>Smile variables</th>
<th>Group comparison</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smile arc</td>
<td>Male x Female</td>
<td>0.008**</td>
</tr>
<tr>
<td>Buccal corridor</td>
<td>Male x Female</td>
<td>0.927</td>
</tr>
<tr>
<td>Gummy smile</td>
<td>Male x Female</td>
<td>0.005</td>
</tr>
<tr>
<td>Midline diastema</td>
<td>Male x Female</td>
<td>0.769</td>
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<tr>
<td>Central incisor crown length</td>
<td>Male x Female</td>
<td>0.163</td>
</tr>
<tr>
<td>Lateral incisor crown width</td>
<td>Male x Female</td>
<td>0.024*</td>
</tr>
</tbody>
</table>

**p ≤ 0.01, and ***p ≤ 0.001.

3.3. Gummy Smiles: The male preferred mean value (2.05) most preferred the control image (i.e., zero gingivato-lip distance, Figure 3a), followed by 1 mm (Figure 3b) and 2 mm (Figure 3c) of gingiva show as their choice (Figure 9a). In the female preferred mean values (2.89), gave preference to 1 mm of gingival show, followed by control image and 2 mm of gingival (Figure 9b). None of them had rated the images with 3 mm and 4 mm of gingival, analysis by one-way ANOVA revealed the significant difference that exists between the male and female within each group (p = 0.000) as shown in (table 1), analysis by Bonferroni’s test revealed the significant difference that exists between the male and female (p = 0.005) as shown in table 2.
3.4. Midline Diastema: A small amount of space between the maxillary central incisors was not rated as unattractive by any group. All the two groups preferred control image with no midline diastema (2.17) male, and (2.29) female. A very small group of male and female also rated the presence of 1 mm and 1.5 mm of diastema as an attractive smile, analysis by one-way ANOVA no significant difference that exists between the male and female within each group (\( p = 0.072 \)) as show in (table 1), analysis by Bonferroni’s test revealed the no significant difference that exists between the male and female (\( p = 0.769 \)) as show in table 2.

3.5. Central Incisor Crown Length: The male preferred mean values (2.34) and for the female (2.48). Crown Length. All the two groups rated control image as their preferred choice in the evaluation, respectively. Both the male and female rated 1 mm of discrepancy as acceptable and non-detectable. However, female rated 2 mm of discrepancy as acceptable and non-detectable, analysis by analysis by one-way ANOVA revealed a no significant difference that exists between the male and female (\( p = 0.138 \)) as show in (table 1 ), analysis by Bonferroni’s test revealed the no significant difference that exists between the male and female (\( p = 0.163 \)) as show in table 2.

3.6. Lateral Incisor Crown Width: All the two groups preferred control image with no midline diastema (2.68) male, and (2.12) female, the male group gave the higher ratings for the control group then for the one with a 1 mm discrepancy. A few of them have also rated 2 mm discrepancy, but their number was of significance compared to the female. Similarly, female gave first preference to the control image followed by 1 mm of discrepancy in their first examination. However, the female could rate up to 4 mm of discrepancy as acceptable and non-detectable in their evaluation. Analysis by analysis by one-way ANOVA revealed a significant difference that exists between the male and female within each group (\( p = 0.022 \)) as show in (table 1 ), analysis by Bonferroni’s test revealed the significant difference that exists between the male and female (\( p = 0.594 \)) as show in table 2.

4. Discussion:

Ethnicity strongly influences the acceptance of a smile type in society [6]. A crucial factor for successful outcome of operative dental esthetic treatment is to appreciate the threshold of what society considers acceptable in terms of abnormal smile features. In this study, six common smile variables affecting the beauty of smile, that is, smile arc, Buccal corridor, gingival display, midline diastema, central incisor crown length, and lateral incisor crown width, were evaluated at outpatient clinic of Dental collage / University of Babylon, which is a major collage in Hila region. An interesting aspect of this study is establishing the threshold level of smile variables, which are affected by alteration in smile features, by considering the initial choices from each male and female groups of raters. I presumed that differences in minor alterations (i.e., 0.5 mm or 1 mm) cannot be perceived well by two groups of raters; hence, the choices would be regarded as pleasant and socially acceptable smile. Considerable group differences for several esthetic discrepancies were observed. Alterations in lateral incisor crown width, however, were perceived by all the two groups.

Ideal smile arc increases smile attractiveness while a flat smile arc significantly reduces it [11–13]. On the contrary, few studies have reported that smile arc does not contribute to the aesthetic value of a beautiful and pleasant smile [14, 15]. Moreover, ethnicity also has a great impact on the preference of smile arc type [6].

A significant difference was observed in the flat smile arc, where in female the flat smile less than the male. This is in agreement with the studies of Sarver et al. where orthodontically treated patient could still have an unattractive smile even after the treatment success due to flattening of the smile arc.

Moore et al. reported that a broader smile with minimum buccal corridor was more acceptable and attractive than a narrow smile with large buccal corridors [16]. Interestingly, no correlations between smile esthetics and the size of the buccal corridors were found in the study of McNamara et al. [14]. Minimal buccal spaces have been accepted as a feature of attractive smile by various races also [12]. Agreeing with Divyaroop Rai et al., the smiles were more attractive when the buccal corridor was absent (Hollywood smile) or when there was a minimal medium-broad ideal buccal corridor. However, the male and female were not critical of an excessive buccal corridor, thus, confirming that the buccal corridor alone is not a critical influence of smile attractiveness.

Extent of gingival display affecting smile esthetics is variable [17]. The attributes of a youthful smile include a full display of the maxillary incisor crowns, with 1-2 mm of gingiva show [18]. Excessive display of the gingiva known as “gummy smile” can render a smile unattractive. A gingival display of up to 1 mm was accepted to be attractive [9]. The present study indicated that a display of up to 2 mm was scored in male, whereas female opined that a display of up to 4 mm was also acceptable. Our result demonstrated that more tolerance for gingival display. This can be attributed to our methodological approach wherein the threshold was based on two ratings for each photograph.

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The presence of a large midline diastema negatively affects smile esthetics, and such persons are considered to be socially less successful [17, 19]. The diastema was considered aesthetic at a threshold level of 1.5 mm, whereas the midline diastema was considered unesthetic provided the width was within 2 to 3 mm [20, 21]. The male and female considered small midline diastema as unattractive [9]. In this study, the threshold for unattractiveness for midline diastema was found to be less in male compared to the female, which is in accord with the with study of Kokich et. al. [17]. The male rated the diastema unattractive when it was more than 1 mm wide, whereas for the female the threshold was found to be 2 mm suggesting a diastema less than 1 mm that is not objectionable for people of Hilla region. Recent studies established that did not distinguish asymmetric central incisor crown length unless one crown was 1.5–2.0 mm shorter than the other [17, 22]. Central incisor crown length shortening lower than 1.5 mm was perceived as equally unesthetic by the two groups [21], gave lower ratings to a central incisor crown length discrepancy of >2 mm. Our study results also corroborated that 2 mm is the limit of acceptability for this variable by female. Asymmetric alterations in teeth appeared unattractive to the male and female [17], the male gave lower ratings to lateral incisor crown width discrepancy of >2 mm. However, this was true for only male in our study. A mesiodistal dimension of 2.0 mm narrower than the ideal lateral incisor crown width was required before it was rated significantly less attractive by male while for male the threshold was 3.0 mm.

A 4.0-mm proportional narrowing of mesiodistal width was necessary for female to rate it noticeably less attractive. Findings from this study suggested that the clinician should initially measure the difference in width between the maxillary lateral incisors before planning any treatment. If the discrepancy is 1 mm or less, restoration is probably not necessary, because it will likely not be recognized. However, if the difference is 2 mm or greater, the narrower tooth should be restored. All the analysis was performed on the female smile which is one of the limitations of the present study. Geron and Atalia [23] in their study had shown that the gender of the smile image affects smile attractiveness, thus, biasing our results. Moreover, another limitation of this study is that the socioeconomic status of the female was not considered, which may have affected the results.

5. Conclusion:
According to the results, the degree of perception of smile esthetics to be attractive varies between male and female. The female were more in variables like buccal corridor, Gummy smile and Lateral incisor crown width. However, the degree of perception of smile esthetics to be attractive varies between male and female. The female were more in variables like buccal corridor, Gummy smile and Lateral incisor crown width. However, some of other variables did not affect the male and female much.

The result showed, the esthetic dentists are more conscious about alterations in elements which used in this study, each representing an altered smile feature in their smile. Hence, should pay attention to these factors during any Esthetic treatment. One of these variables did not affect the male and female much.

The study found majority of male either complete absence or 0.5 mm of alterations in the gingival display, midline diastema, and Central incisor crown length while smiling lateral incisor crown width did not form a critical element of the pleasant and beautiful smile in Hilla population samples.

Hence, the dentist should note of the amount of modifications to be made in the buccal corridor, Gummy smile and Lateral incisor crown width, for esthetic treatment and the patient’s perception of smile esthetics should be given importance before any treatment is intended.

However, the esthetic dentists are more conscious about alterations in six sets elements which used in this study, each representing an altered smile feature in their smile. Hence, should pay attention to these factors during any Esthetic treatment.

6. References:

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