

Influence of Maxillary Incisor Edge Asymmetries on the Perception of Smile Aesthetics among Orthodontists and Laypersons

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Abstract

Background: These perceptions of facial aesthetics influence psychological development from early childhood to adulthood. The appearance of the mouth and smile play an important role in judgments of facial attractiveness. **Aim and Objectives:** This study was conducted to determine the perception of smile esthetics among orthodontists and laypersons with respect to asymmetries of the maxillary incisor edge in a front lower third smile analysis. **Materials and Methods:** Seven photographs of males and seven photographs of females were used for rating the score using visual analogy by the raters. The photographs were altered digitally to produce incisor edge asymmetry in 0.5 mm increments on the incisor edge of the maxillary left central and maxillary left lateral incisors. Orthodontists and laypersons rated the photographs on a scale of one to ten using a visual analog score. Data were analyzed using SPSS, and independent t-tests and ANOVA tests were used for the statistical analysis. **Results:** A total of 65 individuals participated in rating the smile photographs of both male and female of the 65 participants, 33 (50.8%) were specialist orthodontists and 32 (49.2%) were laypersons. There is a significant difference in the groups of asymmetry of 0.5 mm, 1 mm central incisor, and 1mm lateral incisor between specialist orthodontists and laypersons for the images of males. Among the female photographs, a statistically significant difference is seen between the two groups for the 0.5mm left lateral Incisor asymmetry. It can be inferred that for the female photographs, the laypersons were not able to differentiate the asymmetry while the specialist orthodontists has differentiated. **Conclusion:** The orthodontists group was able to note the difference in both male and female smiling lower facial third photographs. The orthodontists were able to differentiate the altered photograph from the original image when maxillary central and lateral incisor edge asymmetry exceeded 0.5 mm for females and males suggesting unacceptable aesthetics that require treatment.

Keywords: Maxillary central incisor, Maxillary lateral incisor, Orthodontists, Laypersons.

INTRODUCTION

Dental appearance has been shown to influence other people's judgments of a person's facial attractiveness as well as of personal characteristics. The smile is determined by the position, shape, size, and shade of the teeth.^[1] Facial aesthetics has been found to be a significant determinant of self and social perceptions and attributions. These perceptions of facial aesthetics influence psychological development from early childhood to adulthood. The appearance of the mouth and smile play an important role in judgments of facial attractiveness.^[2] Aesthetics in dentistry have increasingly become a major concern for patients and often serve as a primary reason for seeking dental care. A balanced proportion between the widths of the maxillary central incisor, lateral incisor, and canine is generally referred to as the golden proportion.^[3] Some patients with great need do not express orthodontic concern, whereas

others with near-ideal occlusion express concern. A difference in the self-perceived notion of aesthetics determines, the health-seeking behaviour.^[4]

Acceptability of dental midline deviations depends on individual factors, including asymmetries associated with other facial midline structures and on the person evaluating the asymmetry (Beyer and Lindauer, 1998). A 2-mm or greater deviation of the dental midline appears to be easily

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detectable by most individuals and, therefore, should be considered when formulating an orthodontic treatment plan. The extent to which treatment should be directed at addressing the asymmetry depends on the magnitude of the deviation, other characteristics of the individual, and the risks and costs associated with the various treatment options proposed to correct the detected deviation.^[5] With the above background, this study was conducted to determine the perception of smile aesthetics among orthodontists, and laypersons with respect to asymmetries of the maxillary incisor edge in a front lower third smile analysis.

The objectives of this study are to evaluate

1. The Influence of maxillary incisor edge asymmetry on smile aesthetics
2. To determine orthodontists and laypersons perceptions of the influence of incisor edge asymmetry on smile aesthetics in front lower third smile analysis.

MATERIALS AND METHODS

Data collection methodology

One female and one male student were chosen from the department of orthodontics and dentofacial orthopedics at Chandra Dental College and Hospital, Safedabad, Barabanki, Lucknow, with a good facial proportion, a skeletal class I profile, an attractive smile, and the principles of the ideal smile described in the literature. A color photograph of each subject was taken in its natural head position while standing. The photographs were altered digitally to produce incisor edge asymmetry in 0.5 mm increments on the incisor edge of the maxillary left central and maxillary left lateral incisors. Seven photographs of males and seven photographs of females were used for rating the score using visual analogy by the raters. The raters are grouped into two groups: one group is the orthodontist, and the other group is the laypersons. Each rater was further asked to evaluate the attractiveness of the seven images of each male and female photograph that were manipulated. Along with the images, each rater received a form with a 10-point visual analog scale. 10 being very attractive, and one score being very unattractive.

Study sample

Two groups of raters were selected. The first group consists of 33 individuals of laypersons in the age group of 18–42 and the second group consists of 32 specialist orthodontists.

Inclusion criteria

For frontal facial images: (a) Subjects having a good facial proportion and skeletal class I profile (b) Subjects having an average smile line revealing 100% of the maxillary anterior teeth (c) Subjects having good dental alignment and tooth size symmetry.^[2]

Exclusion criteria

For Frontal facial images: (a) Restored anterior teeth (b) Abraded anterior teeth (c) Anterior tooth size asymmetry (d) History of traumatic injuries

The representation of the seven photographs of each male and female was as follows: ideal smile, 0.5 mm left central incisor asymmetry, 1 mm left central incisor asymmetry, 1.5 mm left central incisor asymmetry, 0.5 mm left lateral incisor asymmetry, 1mm left lateral incisor asymmetry, 1.5 mm left lateral incisor asymmetry

Data analysis

Data were analyzed using SPSS Version 26, descriptive test results were reported as percentage, Independent t-test and ANOVA test was conducted as an analytical tests to see the difference between the groups.

RESULTS

In the current study, a total of 65 individuals participated in rating the smile photographs of both males and females. Among the 65 participants, 33 were male and 32 were female. The mean age of the study participant was 28 with a standard deviation of 4.34. The median age of the participants was 27, ranging from a minimum of 18 to a maximum of 42. Among the 65 participants, 33 (50.8%) were specialist orthodontists and 32 (49.2%) were laypersons. Among the 33 male participants, 21 were specialist orthodontists and 12 were laypersons. Among the 32 female participants, 11 were specialist orthodontists and 21 were laypersons. The mean and standard deviation of the visual analog scores of two groups for male and female images are reported in Table 1.

An independent t-test was conducted for the VAS scores of specialists and laypersons between the male and female images; the results are reported in Table 1.

DISCUSSION

In our study, a total of 65 individuals participated in rating the smile photographs of both males and females. Of the 65 participants, 33 were male and 32 were female. The mean age of the study participants was 28, with a standard deviation of 4.34. The median age of the participants was 27, ranging from a minimum of 18 to a maximum of 42. Of the 65 participants, 33 (50.8%) were specialist orthodontists and 32 (49.2%) were laypersons. Among the 33 male participants 21, were specialist orthodontists and 12 were laypersons. Among the 32 female participants, 11 were specialist orthodontists and 21 were laypersons. For the ideal male photographs, the specialist orthodontist group rated the score of 7.53, and the laypersons group rated a score of 6.76. For the 0.5 mm left central incisor asymmetry, the specialist orthodontists rated a score of 5.47 and the laypersons rated a score of 7. It was observed that the specialist orthodontists rated a low VAS score for the asymmetry: however, the laypersons were unable to differentiate the 0.5mm and 1mm asymmetry. Both groups have given a low score for the 1.5 mm Central and lateral incisors. An inter-rater reliability kappa statistic and Crohnbach's alpha test were conducted. A good inter-rate reliability with Crohnbach alpha value of 0.78 is seen. Interrater reliability analysis done by Haerian *et al.* has shown a kappa coefficient of 0.806 and

Table 1: Independent t-test results

Asymmetry group	Male images				Female images			
	Specialist orthodontists	Laypersons	P-value	SE	Specialist orthodontists	Laypersons	P-value	SE
Ideal image	7.53 (1.5)	6.76 (2.19)	0.1032	0.468	7.94 (2.1)	7.3 (2.36)	0.269	0.567
0.5 mm left Centralincisor	5.47 (1.3)	7.09 (1.2)	0.001*	0.329	6.34 (2.34)	6.33 (2.34)	0.984	0.545
1 mm left Centralincisor	4.47 (1.7)	5.36 (1.5)	0.0326*	0.409	4.72 (2.34)	4.61 (2.41)	0.84	0.59
1.5 mm Left Centralincisor	3.09 (1.4)	3.39 (1.3)	0.4003	0.354	3.88 (2.46)	3.79 (2.56)	0.88	0.623
0.5 mm left lateral incisor	6.03 (1.42)	6.76 (1.17)	0.028*	0.323	5.94 (2.29)	6.78 (2.25)	0.03*	0.463
1 mm left lateral Incisor	4.31 (1.35)	5.27 (1.6)	0.011*	0.369	4.78 (2.22)	5.06 (2.73)	0.65	0.618
1.5 mm left lateral Incisor	3.28 (1.0)	3.36 (1.57)	0.8059	0.334	3.22 (2.20)	3.7 (2.53)	0.41	0.588

Mean VAS score (Standard Deviation value), *Represents a significant difference

Table 2: ANOVA test-specialist versus lay persons-male images

VarA\VarB	0.5 mm left Central incisor	1 mm left Central incisor	1.5 mm left Central Incisor	0.5 mm left lateral incisor	1 mm left lateral Incisor	1.5 mm Left lateral incisor	Total	F-statistic	P-value
Specialist Orthodontists	5.46	4.46	3.09	6.03	4.31	3.28	4.44	2.34	0.04*
laypersons	7.09	5.36	3.39	6.75	5.27	3.36	5.20		
Total	6.29	4.92	3.24	6.4	4.8	3.32	4.83		

*Represents a significant difference

Table 3: ANOVA test-specialist VS-lay persons-female images

VarA\VarB	0.5 mm left Central incisor	1 mm left Central incisor	1.5 MM left Centralincisor	0.5 MM left Lateralincisor	1 MM left Lateralincisor	1.5 MM left Lateralincisor	Total	F-statistic	P-value
Specialist orthodontists	6.3	4.7	3.8	5.9	4.7	3.21	4.81	0.24	0.94
laypersons	6.3	4.6	3.7	6.4	5.06	3.69	4.99		
Total	6.3	4.6	3.8	6.2	4.92	3.46	4.90		

0.876, and the findings of the present study are in accordance with this study with an acrohnbach's value of 0.78.^[6]

An independent t-test was conducted to see the difference in the perception of the raters. There is a significant difference in the groups of symmetry of 0.5 mm, 1 mm central incisor, and 1 mm lateral incisor between specialist orthodontists and laypersons for the images of males (Table 1). It can be inferred that the Specialist orthodontists were able to differentiate the 0.5 mm asymmetry and 1 mm asymmetry, but the laypersons were not able to differentiate. For the ideal images and images with 1.5 mm symmetry the laypersons and Specialist orthodontists rated them as unattractive, and there is a significant difference in the perception. Kokich *et al.* observed that orthodontists were more critical than dentists when evaluating the asymmetric crown length discrepancies. The study revealed that there is a significant difference ($P < 0.001$) among the specialists and other groups in identifying the 0.5 mm asymmetry; our study results are in accordance with Kokich *et al.*^[7]

Among the female photographs, a statistically significant difference is seen between the two groups for the 0.5 mm left lateral Incisor asymmetry (Table 1). It can be inferred that for the female photographs, the laypersons were not able to differentiate the asymmetry while the specialist orthodontists has differentiated. In a study conducted by Haerian *et al.* to

investigate the effect of dimensional change of the maxillary incisors on smile analysis, three groups of raters scored the photographs at different points in time. The study results showed that a partial deviation from the ideal smile were not able to identify by the laypersons. Our study results have correlated with the finding of the study, as in this current study the specialist were able to differentiate the asymmetry of 0.5mm whereas the laypersons group were not able to differentiate, as a significant amount of difference is observed in the perception of aesthetics of the 0.5 mm asymmetry.^[6]

The ANOVA test results of this study showed that there has been a significant difference between the perceptions of specialist orthodontists and lay persons with respect to the male asymmetry images, (Table 2) whereas no significant difference is seen between the perceptions for the female images (Table 3). The result of this study on the perception of orthodontists is in line with the study of Thomas *et al.*, conducted in the southern part of India. ANOVA test values showed a significant difference in the aesthetic parameter group of crown length with a F-value of 28.968 and a significant $P < 0.05$. The current study supports the findings of Thomas *et al.*^[8] The current study results were similar to the findings of Ribeiro *et al.* In the study conducted by Ribeiro *et al.* on the perception of smile aesthetics and maxillary incisor edge asymmetries,

A significant difference was seen in the altered asymmetry of the 1 mm lateral incisor (46.31 vs. 56.70, $P < 0.05$) and the 0.5 mm central incisor (55.96 vs. 67.78, $P < 0.01$). The study results were similar to the current study when the score of the VAS was extrapolate from a scale of 10–100.^[9]

66.15% of the participants reported that they will seek orthodontic treatment for the photographs of males with 1mm left central incisor asymmetry. 86.15% of the participants reported that they would seek orthodontic treatment for the male 1.5 mm left central incisor asymmetry. 75.38% of the participants reported that they would seek orthodontic care for the male photographs of 1.5 mm left lateral incisor asymmetry. 90.77% of the participants reported that they will seek orthodontic treatment for the female photographs of 1.5 mm left lateral incisor asymmetry. 83.08% of the participants reported that they will seek orthodontic treatment for female photographs with 1.5 mm left central incisor asymmetry.

CONCLUSION

The results of our study suggest that the specialist orthodontists perceived the change in incisor edge asymmetry with much higher frequency than the laypersons. The orthodontists group was able to note the difference in both male and female smiling lower facial third photographs. The orthodontists were able to differentiate the altered photograph from the original image when maxillary central and lateral incisor edge asymmetry exceeded 0.5 mm for females and males suggesting unacceptable aesthetics that require treatment. Laypersons were able to differentiate the photographs of asymmetries of various lengths. A significant difference among the VAS scores is seen in the group of photographs above 1 mm in both male and female photographs. There is a significant difference in the groups of asymmetry of 0.5 mm, 1 mm Central incisor, and 1 mm Lateral Incisor between specialist orthodontists and

laypersons for the images of males. It can be inferred that the Specialist orthodontists are able to differentiate the 0.5 mm asymmetry from the 1mm asymmetry, but the laypersons were not able to differentiate. For the ideal images and images with 1.5 mm asymmetry, the laypersons and Specialist orthodontists rated them as unattractive, and there was a significant difference in perception. Among the female photographs, a statistically significant difference is seen between the two groups for the 0.5 mm left lateral Incisor asymmetry. It can be inferred that for the female photographs, the laypersons were not able to differentiate the asymmetry while the specialist orthodontists has differentiated.

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