

Comparison of perceptions of laypersons, dentists and orthodontists to altered smile aesthetics

Kanwal Sohail^a, Eram Nawaz^b, Owais Khalid Durrani^c, Deebe Akram^d, Arooj Imtiaz^e, Ayesha Iqbal^f, Waleed ahmed Bhatti^g, Ulfat Bashir^h

Abstract

Introduction: Smile plays an important role in facial expression. Esthetic perception varies from person to person, therefore what is beautiful for orthodontist might not be attractive for the patient. So the responsibility on the orthodontist is to create a smile which seems beautiful to the patient and is acceptable to the society and to the laws of esthetics as well.

Material and Methods: This study was conducted in Islamic International Dental Hospital Islamabad in the department of orthodontics from April 2015 to June 2015. It was a cross sectional descriptive study. A colored photograph of a female with well aligned smile was selected and was modified using ABOBE 7.0. Two variables for evaluation were considered, gingival exposure and midline shift. Two sets of pictures included 9 images in total were shown to the 3 panel groups; orthodontists (n=52), dentists (n=60) and lay persons (n=60). The modified images were scored using a 5 point visual analogue scale (VAS) with 0 indicating worst aesthetics and 4 indicating excellent aesthetics.

Results: Three of the groups rated the picture with `no midline shift` as the more attractive smile. Smile with 1mm gingival display was considered attractive by all of 3 groups. It was noted that orthodontists were more critical in judging as compared to dentists and dentists are more discriminating as compared to layperson as significant difference was perceived ($p>0.05$) in the degree of ratings.

Conclusions: Orthodontists, dentists as well as layperson prefer a smile with no midline shift and gingival exposure of 1-2mm. there was no gender difference in the perception of the selected two variables. Orthodontists, dentists and layperson shared more similarities than differences when evaluating smile esthetics.

Keywords: Attractive, gingiva, perception, smile

Introduction

The word esthetics is derive from a Greek word `aesthesis` which means perception¹. Every person has its own

parameters of defining beauty of a subject². Aristotle said beauty is a greater recommendation than any letter of introduction³. Appearance of a personality plays a major key role in social dealings. It has a great affect on the personality development, getting employment, showing performance, self-belief and being victorious. Charisma of a personality and smile attractiveness are co-related. Face is the centre of communication of which smile being the integral part of one`s speech⁴. As every individual has different perception of what an attractive smile is there has always been a near to impossible way to draw clear cut lines between esthetic values and unesthetic ones.

^{a,b,d,e,f,g} BDS, House Officer, Islamic International Dental College, Riphah University, Islamabad.

^c Corresponding Author: BDS, FCPS, MOrthRCSEd, FFDRCSI; Associate Professor, Department of Orthodontics, Islamic International Dental College, Riphah University, Islamabad. Email: owais.durrani@riphah.edu.pk

^h BDS, MCPS, FCPS; Professor, Head Department of Orthodontics, Islamic International Dental College, Riphah University, Islamabad.

But it was utmost important for the dentist and specially orthodontist to quantify beauty that can lead diagnosis and treatment planning while staying at that point that other people find it attractive too⁵. Miller described only trained or keen observant eye can detect any disharmony or asymmetries that's why at times professional opinions about esthetics do not accomplish the expectations of layperson or patient^{3,6}. Esthetic smile is not only regarded currently to teeth but to surrounding soft tissue. These features include gingival display, buccal corridors and midline position⁷⁻¹¹. Peck et al in 1992 made it clear that a gummy smile tends to be unesthetic among orthodontists and Frecker in 1998 reported that gingival display of more than 2mm is considered unappealing¹². Regardless of immense work done to term the parameters for facial esthetics, there have been no precise criterion to relate layperson's perception hence our purpose of the study was to evaluate, using digitally manipulated images, the effects of changes in gingival display and midline shift and their interactions on the perception of smile attractiveness as judged by orthodontists, dentists and lay raters. In this way smile can be enhanced to meet the patients expectations.

Material and methods

It is a descriptive cross sectional study. The study included three groups of evaluators: laypersons (n=60), general dentists (n=60) and orthodontists (n=52). Each group had equal number of male and female participants except for orthodontists which had a male to female ratio of 9:4. Mean age for dentist was 22.1 years, orthodontist 27 years and for layman 23.8 years. The lay group consisted of people without dental background. Each rater was given as little information about the study as possible. The response rate for laypersons was 77%, dentists 75% and orthodontist 42%. A coloured photograph of a female smile with well aligned teeth was

selected. The smile image was modified using Adobe Photoshop 7.0 (San Jose, California, USA). Two variables midline shift and gingival exposure were considered for evaluation. Therefore, changes were performed on the original image so that two sets of photographs were obtained for the evaluation of each characteristics perception on the assessment of smile esthetics. Midline shift increased in increments from ideal to 4mm shift while gingival exposure was altered to produce a gummy smile by progressively moving the upper lip in increments from completely no gingival display to 4mm gingival display. These alterations were chosen based on their frequency and clinical significance to the smile. The nose and chin were eliminated from the images to rule out any confounding variable. These two sets of pictures included 9 images in total. All images were developed into 4x6 inch prints. Each image page was shown separately to the raters. Raters were not allowed to compare between the images. Each image was shown for 1 minute only. Similarly these images were also circulated among the raters especially the orthodontists through a google form and a number of raters nationally and internationally were also approached through social media. The questionnaire consisted of information about the raters' gender, age and qualification. Questionnaires were provided to the evaluators. The attractiveness of the smile in the original images and in each of the modified images was assessed by the three groups and scored using a 5 point visual analogue scale (VAS) with 0 indicating worst aesthetics and 4 indicating excellent aesthetics.

Following was considered as Inclusion Criteria:

- Participants who gave consent to take the questionnaire
- Age 20 to 40 years for all the three groups however exceptions were accepted in orthodontists group

- Education should be graduating or graduated for layperson sample
- Layperson consisted of people working in different professions unrelated to dentistry.

Following was considered as Exclusion Criteria:

- Participants who refused to take the questionnaire
- Layperson should not be having any previous orthodontic procedure
- Dental students, dental attendants and technicians are not included in layperson sample

Data was analyzed using SPSS version 17. Smile esthetics and difference among the 3 groups were subjected to one-way analysis of variance (ANOVA). Additionally post hoc analysis was performed and multiple comparisons were found by applying Tukey test. For all the tests a p-value of 0.05 or less was considered for statistical significance.

Results

The results demonstrated threshold levels between the varying levels of discrepancy. Considering picture set 1, the most rated picture by all the groups was picture 1a while dentists and orthodontists least rated picture 1d and layman least rated both picture 1c and

1d. Similarly, in picture set 2 most rated picture was 2b and least rated picture was 2e by all the three groups. This showed that all the three groups were very critical about the smile esthetics as they all rated wisely. But however ideal results were not seen as shown by the mean VAS scores in Tab I. According to the mean VAS scores it can be seen that dentists were less discriminating of these alterations as compared to the orthodontists and similarly layperson were less discriminating than dentists. Orthodontists could detect the discrepancies at a higher level of distinction than others. The level of significance varied a little as shown in Tab I. There was not any significant difference in the perception of picture 1b, 2c and 2d. There was also no significant difference in the ratings of both male and female except in picture 1c. As post hoc analysis was also carried out, tukey test showed significant difference among layman and dentists and among layman and orthodontists in picture 1a and 2e. Significant difference was shown among layman and orthodontists and among dentists and orthodontists in picture 1c, 2a and 2b. Significant difference was shown among all the groups in picture 1d while there was no difference seen in picture 1b, 2c and 2d. (Tab II)

Table I: Comparison of mean VAS scores among layman, dentists and orthodontist (mean \pm SD)

Variables	Layman (n=60)	Dentists (n=60)	Orthodontists (n=52)	P Value
Pic set 1:				
1a	2.68 \pm 0.892	3.08 \pm 0.944	3.19 \pm 0.627	0.004
1b	2.58 \pm 0.720	2.48 \pm 0.748	2.38 \pm 0.718	0.357
1c	1.95 \pm 0.811	1.90 \pm 1.053	1.48 \pm 0.896	0.016
1d	1.95 \pm 0.964	1.47 \pm 0.965	0.94 \pm 0.938	0.001
Pic set 2:				
2a	2.52 \pm 1.033	2.50 \pm 0.983	1.88 \pm 1.003	0.001
2b	2.63 \pm 1.041	2.80 \pm 0.684	3.19 \pm 0.658	0.002
2c	2.23 \pm 1.226	1.92 \pm 0.944	2.17 \pm 0.901	0.215
2d	1.60 \pm 1.108	1.72 \pm 1.106	1.85 \pm 0.998	0.483
2e	1.29 \pm 1.160	0.85 \pm 1.087	0.67 \pm 0.785	0.006

Table II: Showing multiple comparison with tukey's test

	P value sig	Significant pairs*
Picture 1a Layman Dentists Orthodontist	< 0.05 <i>S</i>	1&2, 1&3
1b Layman Dentists Orthodontists	> 0.05 <i>NS</i>	--
1c Layman Dentists Orthodontists	< 0.05 <i>S</i>	1&3, 2&3
1d Layman Dentists Orthodontists	< 0.05 <i>S</i>	1&2, 2&3, 1&3
Picture 2a Layman Dentists Orthodontists	< 0.05 <i>S</i>	1&3, 2&3
2b Layman Dentists Orthodontists	< 0.05 <i>S</i>	1&3, 2&3
2c Layman Dentists Orthodontists	> 0.05 <i>NS</i>	--
2d Layman Dentists Orthodontists	> 0.05 <i>NS</i>	--
2e	< 0.05 <i>S</i>	1&2, 1&3

Layman
Dentists
orthodontists

*Tukey test. Intra group comparison

Discussion

Orthodontists play a very important role in creating new smiles. It is essential to understand the quest for better appearance among the new generation. An attractive and well balanced smile influences the perception of the individual appearance and personality therefore it is a valuable personal asset. Dale Carnegie said that most important ways to win friends and influence people is to smile.¹³ The goal of the orthodontic treatment should be the attainment of best possible esthetic results. The present study demonstrated the differences and similarities in the perception of smile esthetics among orthodontists, dentists and laypersons. There wasn't any significant difference in the ratings because all the three groups showed similar tendencies in rating the preferences of gummy smile and midline shift. In picture set 1, picture 1a with no midline shift was considered ideal by all and picture 1d with 4mm midline shift was considered unattractive by all along with picture 1c which had 3mm midline shift was also rated least by layperson. Similarly in picture set 2, picture 2b with 1mm gingival display was considered attractive by all and picture 2e with 4mm gingival display was found unattractive by all.¹⁴ A study by Van der Geld P et al showed that gingival display is a critical factor in satisfaction with smile appearance.⁴ Generally gummy smile is often considered more youthful and esthetic therefore it is better to treat gummy smile less aggressively because aging will naturally diminish this characteristic^{7,15}. The only difference lies in the degree of perception as the differences in the mean scores given showed that laypersons were less critical than dentists and orthodontists had high level of

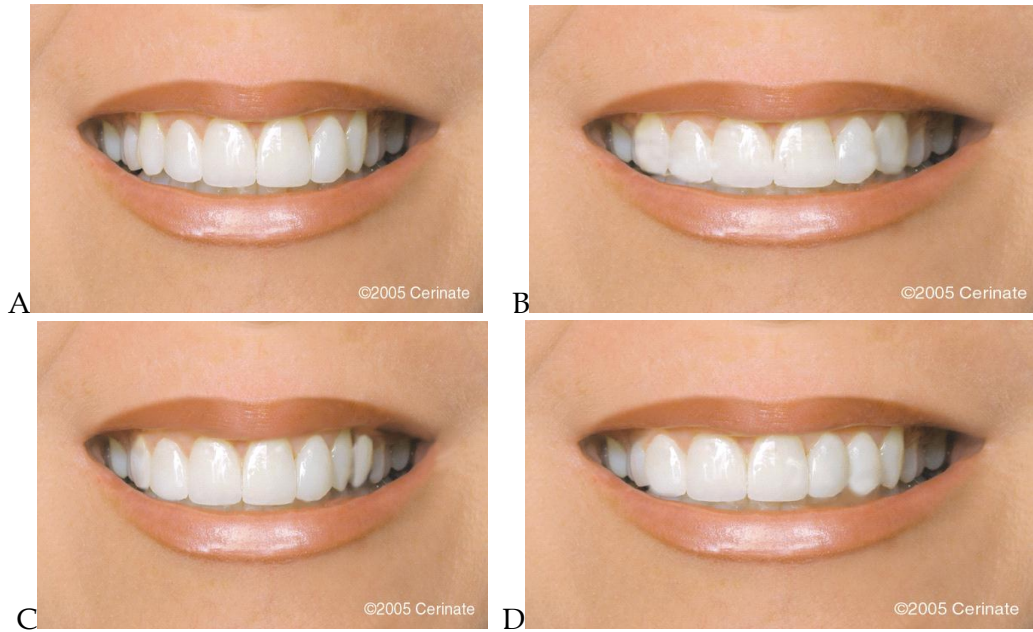


Fig 1: Maxillary dental midline alterations were done. (A: no midline shift, B: 2mm, C: 3mm, D: 4mm midline shift)

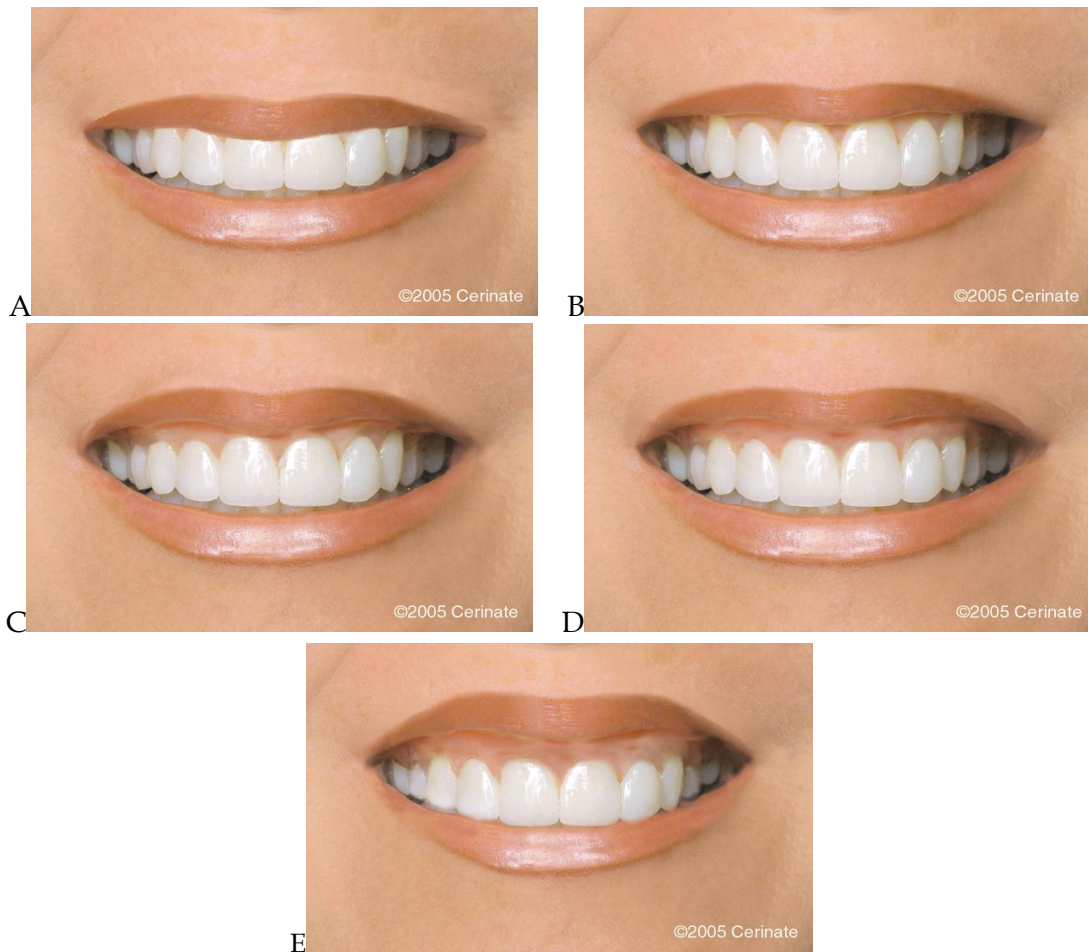


Fig 2: Gingiva to lip relationship was increased incrementally to produce a gummy smile. (A: no gingival display, B: 1mm, C: 2mm, D: 3mm, E: 4mm gingival display).

perception for the discrepancies than dentists. There was no significant difference in the esthetic scores between male and female raters for all the three groups, however Geron and Atalia reported that male and female raters scored images with gingival exposure differently.¹⁶ A Saudi study showed that Saudi dentists and laypeople have lower threshold to excessive gingival show upon smiling and dentists were more sensitive to midline deviations¹⁷. In the study by MB Dutra et al most attractive smile was observed when the upper lip rested on the gingival margin of the maxillary incisors according to the opinion of orthodontists, clinicians and laypeople.¹⁸ Supporting the present study McNamara L et al. showed significant agreement in the judgments between laypersons and orthodontists regarding perception of smile.¹⁹ Contradicting to our study, the results of the study by Kokick showed that laypersons are less judgmental about the perception of esthetics as compared to the dentists and orthodontists.¹⁴ Similarly the study by Milene Brum also expresses different opinions among the dentists, orthodontists and laypersons regarding the influence of gingival exposure.¹⁸ If the smile is evaluated in the whole face, imperfections are not always regarded as disturbing so orthodontists must keep in mind that they don't need to correct everything in the name of esthetics because minor changes are not perceived as good by the laypeople as by the orthodontists in general.^{4,5}

Conclusions

Orthodontists, dentists and layperson shared more similarities than differences when evaluating smile esthetics in the present study. The understanding of esthetic perception is extremely important as this approach can effect the treatment decisions². If the orthodontist perception of esthetics is not consistent with the patient's perception then result will be not acceptable therefore it is important to consider the patient's perception in the orthodontic treatment planning.¹²

References

1. Fonesca A, Nelson J, Maria M. Influence of certain tooth characteristics on the esthetic evaluation of smile. *Dental Press J Orthod*; 2012 May/June;17(3):25.e1-7
2. Liliansa M, Mariano J, Kuchenbecker C. Perception Of Smile Esthetics Varies Between Patients And Dental Professionals When Recession Defects Are Present. *Braz Dent J*; 2013 July/Aug; 24(4)
3. Seth V, Kamath P, Prasad R, Vishvanath. Creating a new smile and a new life with orthodontics. *Orthod Cyber J*; Aug 2011
4. Van der Geld P, Oosterveld P, Van Heck G, Kuijpers-Jagtman AM. Self perception and influence on personality. *Angle Orthod*;2007 Sep;77(5):759-65
5. Kokich VO, Kokich VG, Kiyak HA. Perceptions of dental professionals and laypersons to altered dental esthetics: asymmetric and symmetric situations. *Am J Orthod Dentofacial Orthop*; 2006 Aug;130(2):141-51
6. Bardan S, Mustafa M. Perception of smile attractiveness by laypeople-influence of profession and treatment experience.*Br J Med Med Res*;2014 May; 4(20): 3777-86
7. .Kumar S, Gandhi S, Valiathan A. Perception of smile esthetics among indian dental professionals and laypersons. *Indian J Dent Res*. 2012 Mar-Apr;23(2):295
8. .Pinho S, Ciriaco C, Faber J, Lenza MA. Impact of dental asymmetries on the perception of smile esthetics. *Am J Orthod Dentofacial Orthop*; 2007 Dec;132(6):748-53
9. .Dutra MB, Ritter DE, Borgatto A, Derech C, Rocha R. Influence of gingival exposure on the smile esthetics. *Dental Press J Orthod*; Sept-Oct 2011;16(5):111-8
10. .Kokich VO Jr, Kiyak HA, Shapiro PA. Comparing the perception of dentists and lay people to altered dental esthetics. *J Esthet Dent*; 1999;11(6):311-24
11. .Joi H, Nakata S, Counts AL. Influence of gingival display on smile aesthetics in Japanese. *Eur J Orthod*; 2010 Dec;32(6):633-7.
12. .Tuzgiray YB, Kaya B. Factors Affecting Smile Esthetics. *Turk J Orthod*; 2013;26(1):58-64
13. .Kiani H, Bashir U, Khalid O, Zulfiqar K. Comparison Of Difference In Perception Between Orthodontists And Laypersons In Terms Of Variations In Buccal Corridor Space Using Visual Analogue Scale. *Pak Orthod J*; 2013;5(2): 67-72
14. .Parekh SM, Fields HW, Beck M, Rosenstiel S. Attractiveness of variations in the smile arc and buccal corridor space as judged by orthodontists and laymen. *Angle Orthod*; 2006 Jul;76(4):557-63
15. . Naik P, Manohar MR, Shivprakash G, Jabeen N. Smile Esthetics - Evaluation of Differential Perception among Laypersons, Dental professionals and Orthodontists. *IOSR-J Dent Med Sci*; Jan 2014;13(1):35-43

16. Talic N, AlOmar S, AlMaidhan A. Perception of Saudi dentists and lay people to altered smile esthetics. *Saudi Dent J.* 2013 Jan; 25(1): 13-21
17. Rai D, Rai A, Gill V, Rai T. Perception of Smile Esthetics: A comparative Evaluation in orthodontist and laypersons. *Adv Hum Biol;*2013; 3(1):29-36.
18. Geron S, Atalia W. Influence of sex on the perception of oral and smile esthetics with different gingival display and incisal plane inclination. *Angle Orthod.* 2005 Sep;75(5):778-84.
19. McNamara L. et al. Hard and soft-tissue contributions to the esthetics of the posed smile in growing patients seeking orthodontic treatment. *Am J Orthod Dentofacial Orthop* 2008; 133:491-9