

Influence of Orthodontic Treatment on Smile Attractiveness as perceived by Common People, General Dentists and Orthodontists

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ABSTRACT

Objectives: To analyze the influence of orthodontic treatment on smile attractiveness as perceived by common people, general dentists and orthodontists.

Materials and methods: The photographic records of 114 patients were screened and 72 patients who fulfilled the inclusion criteria were selected. The pretreatment and post-treatment smile photographs were rated on a 10-point scale by panels of common people, general dentists and orthodontists. Data were analyzed by one-way analysis of variance (ANOVA) with Tukey's post hoc test.

Results: The mean esthetic scores for pretreatment images as evaluated by the three panels; orthodontists, general dentists and common people were 3.26, 3.20 and 3.31 respectively. The difference in esthetic scores between these three groups was not statistically significant ($p > 0.05$). For post-treatment images, the mean esthetic scores by the three panels; orthodontists, general dentist and common people were 6.45, 6.50 and 7.32 respectively. Esthetic scores between these three groups differed significantly ($p < 0.05$) with common people displaying significantly higher score than orthodontists and general dentists, however no difference was seen between orthodontists and general dentists. It was also seen that the percentage change in mean esthetic scores from pre- to post-treatment smile was significantly higher for common people as compared to orthodontist ($p < 0.05$) and no difference was seen between orthodontists and general dentists or common people and general dentists respectively.

Conclusion: Though there is no difference in perception of smile esthetics between common people, general dentists and orthodontists, the influence of orthodontic treatment on smile attractiveness is appreciated differently by the common people as compared to general dentists and orthodontists.

Keywords: Common people, Perception, Smile esthetics.

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INTRODUCTION

Cosmetic dentistry has long been interested in the esthetics of the smile. Recently, the topic has become important for orthodontists because more orthodontic patients evaluate the outcome of treatment by their smiles and the overall enhancement in their facial appearance.¹⁻³ Standards of beauty vary tremendously among people and racial groups, and according to socioeconomic status.⁴ Many studies⁵⁻⁷ have evaluated the perceptions of different panels for dentofacial esthetic discrepancies by digital image manipulations. Several authors⁸⁻¹⁰ have studied the smile esthetics using objective criteria like incisor exposure, gingival display, buccal corridor, etc. However, it will be inappropriate to evaluate smile esthetics quantitatively or to compare the perceptions of different panels by using objective criteria.

Sarver¹¹ has rightly stated that an eye for beauty is an important attribute for an orthodontist. Though assessing the beauty is quite subjective and is associated with many factors, the orthodontists have responsibility to understand the patient's perception of esthetics. It will be more logical to assess smile esthetics evaluated by laypeople as they are the primary consumer of orthodontic services, and satisfaction with treatment depends on patient expectations. None of the studies have evaluated the orthodontic treatment success in terms of smile esthetics as evaluated by common man without using objective criteria.

The aims of our study were to (1) analyze the influence of orthodontic treatment on smile attractiveness (2) to determine whether the perception of orthodontists, general dentist and the common people differs in terms of change in smile esthetics before and after orthodontic treatment.

MATERIALS AND METHODS

The photographic records of 114 patients who had undergone orthodontic treatment at the Department of Orthodontics and Dentofacial Orthopedics of our

institute were screened and 72 patients were selected. The subjects who were treated by the same operator having permanent dentitions were included in the study. Exclusion criteria were missing tooth visible on smiling or prosthodontic/restorative work on tooth/teeth visible on smiling, visible periodontal disease, abnormally sized or shaped teeth, mixed dentition, excessive dental attrition, lip irregularities or history of lip surgery. A signed consent form was obtained from each patient granting us permission to use their photographs for the study concealing their identity.

All subjects were treated with maxillary and mandibular fixed appliances (018" × 025" slot Roth PEA). Each subject's pretreatment and post-treatment frontal posed smile photographs were taken with a digital camera (Samsung SMX-K44SP). The patients had their heads in natural head position and were asked to give a 'relaxed, natural smile'. Each photograph was cropped using photo-editing software (Adobe Premiere, version 6.0, Adobe, San Jose, Calif) to show only the full smile of the patient. The cropped images were converted to black and white and were copied in the slides in Power point (Microsoft Office 2007). On each slide two cropped images, pretreatment and post-treatment, of the same patient were displayed (Figs 1 and 2). These pretreatment and post-treatment smile photographs were evaluated by a panel of six orthodontists, a panel of six general dentists and a panel of six common people not associated with dentistry. Each panel consisted of three males and three females to eliminate gender bias. The raters were shown the 72 slides, each showing two views of the same people during smiling. They were asked to rate the attractiveness of the smiles on a 10-point scale, with 10 as 'excellent' and 1 as 'poor.' The raters were allowed to view the slides again and revise their scores, if they desired.

To check the repeatability, one rater was randomly selected from each of the three groups and sample was re-evaluated 1 month later. The scores of these 3 raters were found to be in the range of good repeatability ($p > 0.05$). Data were summarized as mean \pm SD. One-way analysis of variance (ANOVA) was used to compare the means of the 3 groups. If the ANOVA showed statistical significance, Tukey's test was done to determine which groups were significant from the others. All the analyses were done using SPSS version 16. A p-value of <0.05 was considered statistically significant.

RESULTS

The mean esthetic scores as evaluated by the three panels; orthodontists, general dentists and common people for pretreatment images were 3.26, 3.20 and 3.31 respectively. The difference in esthetic scores between these three groups was not statistically significant ($p > 0.05$) (Table 1).

For post-treatment images, the mean esthetic scores by the three panels: orthodontists, general dentist and common people were 6.45, 6.50 and 7.32 respectively. Esthetic scores between these three groups differed significantly ($p < 0.05$). Common people had significantly higher score than orthodontists and general dentists. No difference was seen between orthodontists and general dentists (Graph 1).

The change in smile esthetics was calculated as percentage change in esthetic scores of pretreatment and post-treatment images. There was more than 100% change in smile perceived by all the three panels. The percentage change in smile was significantly higher for common people as compared to orthodontist ($p < 0.05$) and no difference was seen between orthodontists and general dentists or common people and general dentists (Graph 2).



Fig. 1: Pretreatment smile

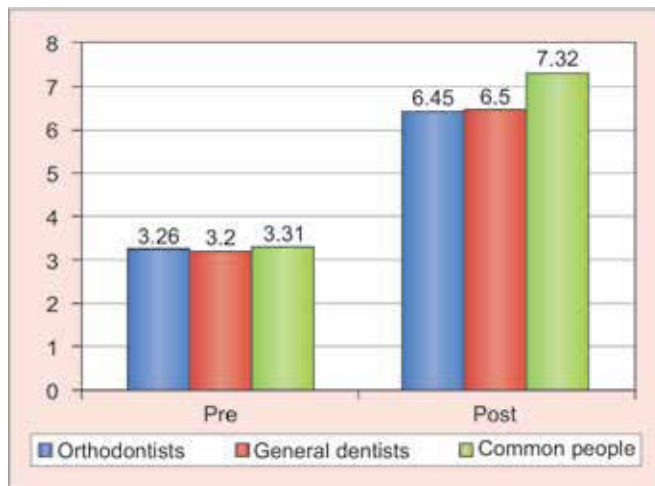
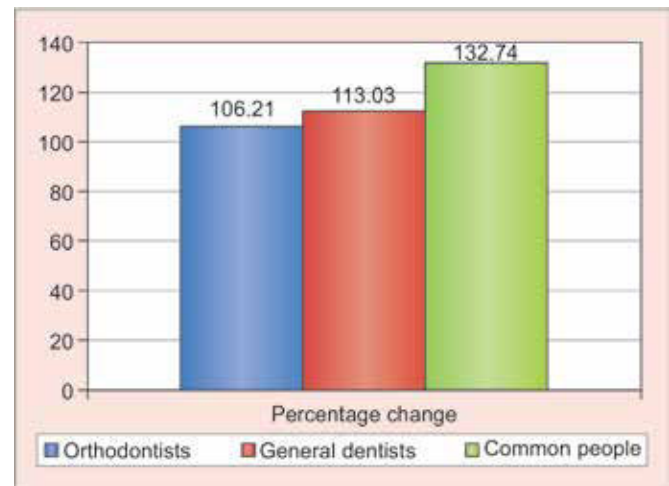


Fig. 2: Post-treatment smile

Table 1: Comparison of mean esthetic scores of pretreatment smile, post-treatment smile and percentage change in smile as evaluated by three panels

	Group						p-value	Post hoc test
	Orthodontist		General dentist		Common people			
	Mean	SD	Mean	SD	Mean	SD		
Pre	3.26	0.70	3.20	0.75	3.31	0.75	0.679, NS	
Post	6.45	0.71	6.50	0.74	7.32	0.57	< 0.001, S	LP > ortho, GD
Percentage change	106.21	45.39	113.03	52.76	132.74	58.42	0.008, S	LP > ortho

NS: Not significant; S: Significant; GD: General dentist

**Graph 1:** Mean esthetic scores of pretreatment smile, post-treatment smile as evaluated by the three panels**Graph 2:** Mean percentage change in smile as evaluated by the three panels

DISCUSSION

Not so long ago, the patient's thoughts and perceptions were considered less important than that could be physically measured during clinical examination or analysis of diagnostic images. That changed dramatically in the 1990s, as the focus of health care generally shifted from control of pathology to a broader emphasis on health-related quality of life.¹² It is appropriate to say that the major reason for treatment of dentofacial problems is to improve the quality of life. Therefore, it is important to evaluate not only the physical characteristics of the condition but also its impact on the patient's feelings and perceptions.

It is now accepted that modern orthodontic treatment requires a shift away from Angle's paradigm of achieving ideal occlusion to the more esthetically focused soft tissue paradigm that is based on the patient's overall benefit.⁹ Wylie¹³ emphasized, 'the goal of the orthodontic treatment should be the attainment of best possible esthetic results both dentally and facially'.

Over the years, various studies^{5-10,14,15} have been done on human faces describing smile esthetics by taking various quantitative and qualitative soft-tissue measurements of the face at rest as well as during smile to describe the various parameters influencing subject's

smile. Ricketts was the first to claim that the analysis of a physically beautiful face should be approached mathematically, and he advocated the use of golden proportions in that respect. Mackley¹⁴ evaluated the smiles before and after orthodontic treatment and found correlation of smile attractiveness with incisor torque, protrusion, profile, stomion-incision and maxillary incisor to NA line. Johnson and Smith¹⁵ studied the smile esthetics after orthodontic treatment with and without extraction of four first premolars and found no correlation of smile esthetics with two types of treatment. Kerr et al¹⁶ comprehensively investigated perceptions of smiles along a continuous range, where the evaluator digitally modified smiles using a mouse driven slider to select the most ideal and the thresholds of acceptability.

However it is will be unwise to establish standards for attractiveness of smile as it is subjective. Hence, in our study we have used only the subjective evaluation of the smile by using rating from 1 to 10 with 1 as 'poor' esthetics and 10 as 'excellent'. The raters were asked how they liked the smile and told to base the ratings on their feelings.

Another important consideration in evaluating the smile esthetics is whose judgment is used to make the esthetic evaluation. Several studies¹⁶⁻¹⁸ confirm that dentists and laypeople judge facial esthetics differently. Therefore, this study has mainly focused on

esthetic ratings of smile evaluated by laypeople as they are the primary consumer of orthodontic services, and satisfaction with treatment depends on patient expectations.

The present study demonstrated the differences and similarities in how orthodontists, general dentists and common people evaluated the success of orthodontic treatment in relation to improvement in smile. An insight into mean scores given by the different panels reveals valuable information.

The common people gave highest scores whereas orthodontists gave least scores to pretreatment smile. However, there was no significant difference between the ratings of the three groups. This indicates there is no difference in perception of smile esthetics before treatment between common people, general dentists and orthodontists. Erum et al¹⁹ found that orthodontists, dentists, common people share more similarities than the differences when evaluating dental esthetics. These findings agree with those of Isiksal et al²⁰ who found no difference in perception of smile esthetics as judged by six panels of orthodontists, plastic surgeons, artists, general dentists, and parents subjects with ideal occlusions and class I patients treated with or without extractions. Boley et al²¹ stated that orthodontic students and general dentists could not identify the treatment modality when assessing facial photographs. This finding demonstrates the ability of humans to appreciate esthetics even in the absence of technical knowledge. This shows how important it is to consider the patient perception in the treatment planning.

The success of orthodontic treatment as perceived by the three groups was assessed as percentage change in esthetic scores of pretreatment and post-treatment smile images. The percentage change in smile was significantly higher for common people as compared to orthodontist ($p < 0.05$) and no difference was seen between orthodontists and general dentists or common people and general dentists (Table 1). This indicates the perception differs when it comes to evaluation of the change in smile following orthodontic treatment.

The mean actual esthetic scores show that orthodontists in general rated lower scores indicating that they had higher esthetic standards. These findings agree with those of Isiksal et al²⁰ but contrast with that of Hulsey²² who reported that common people had no preference in variables determining smile attractiveness. Orthodontists and general dentists appeared to have more similar perception of smile esthetics and differed from the common people. However, dentists have been sensitized to observe and evaluate features that do not seem to influence the general public. To the extent that the esthetic judgment of dentists systematically differs

from the lay public, the particular preferences of dentists are of little relevance or importance.^{15,23}

CONCLUSION

- There is no difference in perception of smile esthetics between common people, general dentists and orthodontists for untreated subjects.
- There is significant difference in the perception of change of smile esthetics between the common people and orthodontists.
- The influence of orthodontic treatment on smile attractiveness is appreciated differently by the common people as compared to general dentists and orthodontists.

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