

The Perception of Dental Esthetics Assessed by Prosthodontic Residents and UAE Recognized Specialists in Prosthodontics

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Abstract

Introduction: Smiles can be improved by veneering teeth using a relatively conservative technique. The appearance of veneers and smile design has not been previously investigated in the UAE. This study aimed to assess the aesthetic preferences of different smile designs rated by a group of prosthodontic residents and specialists.

Methods: A questionnaire was devised asking about demographic details such as age and gender as well as clinical experience before and after graduation. Images of ten cases who had ceramic veneers fitted on their anterior teeth were included in the questionnaire. There were two images for each case: smiling with lips shown and close-up with retracted lips and cheeks. A total of seven questions regarding the appearance for each case were posed to each rater. Each question had a 5 point Likert rating scale from poor to excellent. All residents in prosthodontics at HBMCDM and UAE recognized specialists in prosthodontics were invited to participate. The specialists were recruited from the DHA/CPQ database.

Result: A total of 25 dentists rated the 10 cases. There were 12 residents and 13 specialists, 40% were from the UAE and 60% from other countries. The residents were significantly younger than the specialists with mean ages of 29.4 years and 43.0 years respectively ($p < 0.001$). Ten raters were male and 15 female. An overall amalgamated mean score was calculated for each case by summing all 7 individual scores for the 7 questions by rater. Males rated case 8, visible papillae following lip contour, significantly more highly than females ($p < 0.004$). The overall ranking of the 10 cases was determined by gaining a mean % score for each case by summing the Likert scores for all seven questions and dividing by the maximum score of 35 per case. Both the residents and specialists agreed that case 9 (long teeth contacting the lower lip) was the most pleasant (68%) and that case 5 (midline discrepancy) was the most unattractive (39%). Overall, cases 9 and 6 were the most pleasing and cases 5 and 10 were the most displeasing.

Conclusion: The residents and prosthodontic specialists were mostly in agreement when rating the esthetics of several different smile designs. Symmetry and the upper lip just covering the upper gingival margins were the most pleasing whilst a non-coincident midline and gingival inflammation were deemed the most unattractive.

A perfect smile improves the self-confidence, personality; social life and psychology by improving self-image with enhanced self-esteem of the patient. While not every person is born with a perfect and attractive smile, qualities such as straightness, cleanliness or whiteness of teeth may come to mind. Thanks to developments in the field of cosmetic dentistry, people can change the smile they were born with into a smile they love. Several treatment modalities have been proposed to restore the aesthetic appearance of the dentition such as chemical bleaching or full crowns which was considered the most predictable and durable aesthetic correction of anterior teeth. However, this approach is undoubtedly most invasive with substantial removal of large amounts of sound tooth substance and possible adverse effects on pulp and periodontal tissues. Dental veneers (sometimes called porcelain veneers or dental porcelain laminates) are wafer-thin, custom-made shells of tooth-colored materials designed to cover the front surface of teeth to improve the

appearance. These shells are bonded to the front of the teeth, changing their color, shape, size, or length. Dental veneers can be made from porcelain or from resin composite materials. Porcelain veneers resist stains better than resin veneers and are better at mimicking the light reflecting properties of natural teeth. Resin composite veneers are thinner and require less tooth structure removal before placement. Laminate veneers are the alternative to the more invasive full jacket crowns to achieve this goal. No longer is it acceptable to over prepare teeth for convenience or lack of understanding of alternative treatments. Minimally invasive dentistry is not merely a simple obligation, but a professional duty. More conservative treatments have become common since veneers were introduced in the 1980s as an alternative technique to full coverage crowns. Publications by Simonsen describe the elegant concept of bonding thin, etched porcelain veneer (PV) restorations to the labial and buccal surfaces of teeth. Although some clinicians advocate that PV restorations be

bonded without the need for tooth preparation, some minimal tooth reduction may result in better contours and improved esthetics. The preparation guidelines stated:

1. Slight modification of labial enamel to reduce bulges.
2. A 0.5 mm shallow chamfer incisal or occlusal to the cervical line of the tooth in the gingival enamel.
3. Slight incisal overlap to ensure that the ceramic margins are not subjected to occlusal forces.
4. Proximal preparation up to the labial contact areas.

A preparation depth of approximately 0.5 mm allows the veneer to be in confluence with the natural contours of the tooth, as well as providing the necessary thickness for creating the desired hue, Chroma, and value characteristics of the porcelain restorative material. The porcelain laminate veneer restorations have been praised by Friedman, as “the premier esthetic restoration of the 20th century” Friedman 2012. who were the first clinicians to describe the porcelain veneer technique, considered the following to be indications for provision of porcelain veneers: i) masking discolorations such as fluorosis and tetracycline staining, ii) hypo calcification, iii) fractures, iv) malformed teeth and v) amelogenesis imperfecta. Porcelain laminate veneers offer a predictable and successful restoration with an estimate survival probability of 93.5% in 10 years. Significantly increased failure rates were associated with bruxism and non-vital teeth and marginal discoloration was worse in patients who smoked. Layton, et al. investigate the clinical outcome and the survival rate of feldspathic porcelain laminate veneers for up to 21 years; he found that the feldspathic porcelain veneers have excellent long-term survival with a low failure rate. On the other hand, esthetics has become an increasingly important requirement in our society. Improved esthetics is one of the most common reasons for patients to seek prosthodontic treatment. Furthermore, dentofacial esthetics is not only important in itself; it is also related to other more general concepts of well-being. Davis, et al. found that esthetically pleasing tooth restorations were positively correlated with a patient’s self-esteem and quality of life [1]. Van der Geld, et al. showed that an attractive smile in particular is important from a psychosocial View point, and this supports the general public opinion that dentofacial esthetics are important for personal success [2]. The assessment of dentofacial esthetics and appearance is challenging because these are neither directly observable nor measurable and several factors such as culture affect a patient’s perceptions. Although a comprehensive interview targeting the individual patient’s concerns and expectations is the most appropriate assessment method, this approach is complicated, consumes time and is difficult to standardize, this poses problems when used in research. One of the most commonly used methodologies to investigate a patient’s esthetic perceptions is the ranking of clinical photographs according to esthetic discrepancies [3]. The patients demand for treatment of unaesthetic anterior teeth is steadily growing. Accordingly, several treatment options have been proposed to restore the aesthetic appearance of the dentition. The great progress in bonding capability to both enamel and dentine made with the introduction of multi-step total etch adhesive system, along with the development of high performance and more universally applicable small particle hybrid resin composites has led to more conservative restorative adhesive techniques to deal with unaesthetic tooth appearance. Resin composite veneers can be used to mask tooth discolorations and/or to correct unaesthetic tooth forms and/or positions. However, such restorations still suffer from a limited longevity, because resin composites remain susceptible to discoloration, wear and marginal fractures, reducing thereby

the aesthetic result in the long term. In search for more durable aesthetics, porcelain veneers have been introduced during the last 2.5 year. Glazed porcelain veneers were proposed to be durable anterior restorations with superior aesthetics. The idea of porcelain veneers is not a new one. In 1938, Dr. Charles Pincus described a technique in which porcelain veneers were retained by a denture adhesive during cinematic filming. The fragile restoration had to be removed after filming because no adhesive system existed at that time to permanently attach them. Simonsen and Calamia as well as Horn reactivated the interest in porcelain veneers by introducing special acid etching procedures that substantially improved the long term porcelain veneer retention. They demonstrated that the bond strength of a hydrofluoric acid-etched and silanated veneer to the luting resin composite is routinely greater than the bond strength of the same luting resin to the etched enamel surface. From the moment porcelain veneers could be adhesively luted, the clinical and laboratory techniques have continued to be refined.

Materials and Methods

A questionnaire was devised asking about demographic details such as age and gender of the participant, educational country as well as clinical experience before and after graduation. Images of ten cases that had ceramic veneers fitted on their anterior teeth were included in the questionnaires. There were two images for each case: smiling with lips shown and close-up with retracted lips and cheeks. Each case had 7 questions and the respondents were asked to evaluate and compare the dental aesthetics patterns of porcelain laminate veneer for each case. Each question had a 5 point Likert rating scale from poor to excellent. Images of veneers were taken from patients treated in Ministry of Health Centers in UAE and private dental clinics in Sharjah and Dubai. All patients were over 18 years old and had a minimum of two and up to a maximum of ten porcelain laminate veneers in the maxillary and/or mandibular anterior region placed more than 6 months previously. Patients were not included if any of the following conditions were present, teeth indicated for restoration (for example with a crown) and the presence of advanced dental caries. A questionnaire was distributed among 25 clinicians, they were selected from UAE recognized Specialists in prosthodontics and prosthodontic residents from Hamdan Bin Mohamed College of Dental Medicine. The specialists were recruited from the DHA/ MOH/CPQ database. The participants were therefore not a random sample but a convenience sample and not representative of the residents or specialist prosthodontists in Dubai or in the UAE.

A Total of 10 Cases Were Evaluated by Each Clinician. The Different Clinical Situations Were as Follows:

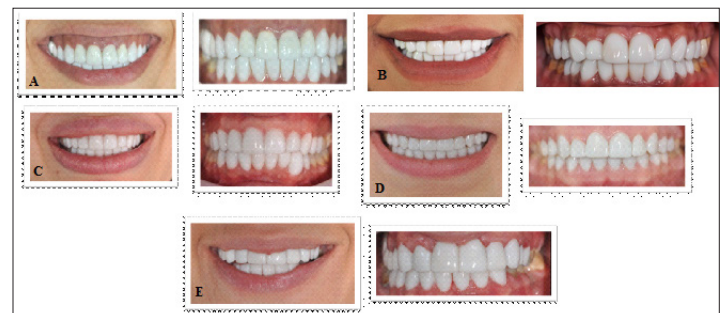


Figure 1: A, case1, Gummy smile with visible lower teeth; B, case2, Flat incisal plane not following the lower lip line; C, case3, Square teeth with flat incisal plane; D, case4, Half-crowns visible; E, case5, Midline discrepancy



Figure 2: A, case6, Incisal plane following lower lip line; B, case7, Good incisal curvature following the lower lip line with very white teeth; C, case8, visible papillae following the lower lip curvature and no contact with lower lip; D, case9, Long teeth contacting the lower lip; E, case10, Gingivitis

The participants evaluated the appearance of the patient smile, veneer shape, contour and shade, the length/width ratio of the teeth, the relationship of incisal edges to the lower lip, the relationship of the soft tissue around the teeth and the tooth display and lip position when smiling.

Results

Twenty-five prosthodontists (12 prosthodontic residents and 13 UAE recognized specialists in prosthodontics).

40% were from the United Arab Emirates and 60% from other countries.

Table1: Characteristics of all the responding prosthodontists

Item	No. (%)
Gender	10 (40)
Male	15 (60)
Female	15 (60)
Country of undergraduate studies	17 (68)
Arabic	
Asia	4 (16)
Western	4 (16)
Country of postgraduate studies	15 (60)
UAE	
Others	10 (40)
Participants age, mean (SD)	36.48 (9.56)

Table 2: Comparison of the overall score of the responses for each case by gender

Score of responses from	Gender	Number	Mean (sd)	p-value
Case 1	Male	10	15.2(3.35)	0.64
	Female	15	14.4667(4.09)	
Case 2	Male	10	16(5.66)	0.801
	Female	15	16.6(5.85)	
Case 3	Male	10	13.6(5.06)	0.638
	Female	15	14.4667(4.02)	

Case 4	Male	10	17.2(5.2)	0.544
	Female	15	15.9333(4.94)	
Case 5	Male	10	9.1(3.21)	0.251
	Female	15	10.4(2.32)	
Case 6	Male	10	18.9(4.15)	0.936
	Female	15	19.0667(5.51)	
Case 7	Male	10	16.8(3.85)	0.615
	Female	15	15.8(5.33)	
Case 8	Male	10	22.7(4.83)	*0.004
	Female	15	16.7333(4.51)	
Case 9	Male	10	22.1(6.35)	0.236
	Female	15	19.1333(5.71)	
Case 10	Male	10	11.9(6.43)	0.556
	Female	15	10.8(2.59)	

Only case 8 showed a difference in response according to gender ($p=0.004$), the mean score was 22.7 and the standard deviation was 4.83 for males and for females it was 16.7333 (4.51). The higher score for male respondents indicates greater attractiveness was perceived by males than females for this image.

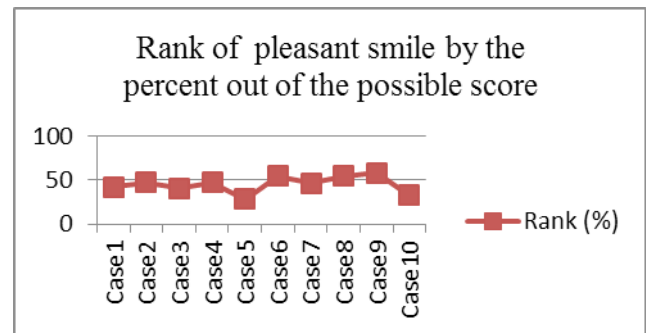


Figure 1: Rank of the overall appearance by case

Shows the rank of the best and worst smile chosen by the participants. The specialists in prosthodontics and residents both agreed that case 9 which showed long teeth contacting the lower lip, is the most pleasant smile, while case 5 which shows a midline discrepancy was rated worst. Images 6 and 9 were the most pleasing overall, where images 5 and 10 were the most displeasing.

The Results of the Answers of the Participant to Each Question

In case 3, question 2 in which the teeth are square with flat incisal plane, the Chi-Square was=0.083 which have tendency toward significant different in the aesthetics perception between the prosthodontics residents and the UAE recognized specialist in prosthodontics, in this case as 9 of 13 UAE recognized specialist in prosthodontics thought that the shape and contour of the veneer were poor and 3 of 12 prosthodontics residents show poor too. Furthermore, a significant difference in the evaluation of the relationship of incisal edge to the lower lip was found ($P<0.014$).

In case 3, question 5 there were significant differences between the evaluation of the prosthodontic residents and the UAE recognized specialists in prosthodontics as the P value show $p<0.014$.

There were significant differences in the aesthetic perception of the porcelain veneer in case 8 questions 4, as 35% of the prosthodontic residents thought it poor, while none of the UAE recognized specialist in prosthodontics thought that it was poor and there evaluation was from good to very good.

Discussion

Dale Carnegie described the smile as one of the most important methods of influencing people. Improved esthetics is one of the most common reasons for patients to seek prosthodontic treatment and there are indications that in general dentistry, the focus has shifted from functional restorative dentistry to esthetic dentistry due to a decrease in caries prevalence Samorodnitzky-Naveh [2].

Today, physical appearance plays a major role in self-esteem and, as a result, also in the overall satisfaction of the person. Facial esthetics plays a crucial role, with the smile being the focus of the face. A multidisciplinary approach is usually needed in order to create a pleasing end result. With the Smile's Aesthetic Evaluation Form (SAEF), Sousa Dias and Tsinqene. Proposed a new evaluation of the esthetics of the smile. It uses both static (photographs) and dynamic (videos) analysis, followed by several objective and subjective items, thus improving communication between different dental specialists and laboratory technicians. The SAEF also provides the patient with knowledge of the disharmonies of the smile and increases the patient's comprehension and acceptance of treatment. It is organized in such a way as to provide an understanding of the esthetic parameters of the smile individually and simultaneously, evaluate the quality of the smile for the specific case. A porcelain laminate veneer is one of the most conservative and aesthetic techniques that we can apply when restoring the human dentition and change their smile. Since their development 25 years ago, interpreting the indications and applying the correct techniques has been key to improving their longevity [4]. Long- term (15 and 20 years) retrospective studies indicated that the success rates of veneers are as high as 94% to 95% [5]. Currently, the use of porcelain laminate veneers is almost routine for patients with alterations in the shape and colour of their teeth, as well as in slight malposition, closing of gaps, etc., a set of indications that are modified and broadened as dentists acquire more confidence in the technique and as the ceramics improve in their aesthetic and physical properties [5,6]. In vitro and vivo studies indicated that porcelain veneers are strong and durable restorations in the medium to long term when enough intact tooth tissue is left to bond the porcelain veneer and when occlusion and articulation are not pathological. This study has shown some significant differences in aesthetic perception between prosthodontic specialists and the prosthodontic residents. Several studies have evaluated aesthetic perception of different malocclusions. Indices have also been created to measure dental esthetics based on a relatively standardized set of variables. These esthetic indices assess treatment need according to occlusal health but do not focus directly on anterior dental esthetics. With the exception of gingival margin discrepancies, Kokich, et al. has shown that orthodontists recognize specific dental esthetic discrepancies more readily than lay people. General dentists and lay people have similar threshold levels for assessing midline deviation, gingival margin discrepancy and gingiva-to-lip distance [3].

In this study we compared the evaluation of 10 cases with anterior veneers by prosthodontic residents and recognized specialists in prosthodontics. They rated the appearance of the smile regarding the shape, shade, the length/width ratio, the relationship of the

incisal edges to the lower lip and the soft tissues around the veneers and the display and the lip position when smiling. Of the 25 raters, 40% were from the United Arab Emirates and 60% were from other countries. In most of the cases there were no significant differences in aesthetic perception, as most of the participants agreed. Some of the cases, for example case 3, which shows square teeth with flat incisal plane, 9 of 13 specialists in prosthodontics thought that the shape and the contour of the veneers were poor, while only 3 of 12 prosthodontic residents found it poor (P value $p < 0.014$). In case 8 question 4, in which the papillae are visible and the upper incisors do not contact the lower lip, there was also significant differences in the aesthetic perception, as 35% of the prosthodontic residents thought that the length/width ratio of the veneers was poor, while none of the UAE recognized specialists thought it poor, as they evaluated it from good to very good. Case 8 also showed a difference in response according to gender, as the mean score was 22.7 (4.83) for males and for females it was 16.7333 (4.51). The higher score for male respondents indicates greater attractiveness was perceived by males than females for this image.

Both specialists and residents agreed that case 9, with long teeth that following the lower lip was the most pleasant smile as it follows the ideal guidelines, with a lower smile line and symmetrical upper anterior teeth. The laterals look shorter than the canines around 1.5 mm, the canines have the same length as the centrals and follow the lower lip line. The shade nicely matches the skin color and look natural. Regarding case 5, which had a midline discrepancy, both groups of dentists agreed that it was the worst smile as it does not follow the esthetic guidelines: the central and lateral incisors look wide and longer than the canine, giving an un-natural look. The straight incisal plane does not follow the lower lip line with a midline discrepancy more than 3 mm and inflamed papillae [3].

Conclusion

In this study the prosthodontic residents and the UAE recognized specialists in prosthodontics were mostly in agreement with the case ratings. Case 9 (Long teeth contacting the lower lip) was rated as the most pleasant smile while case 5 (Midline discrepancy) was rated as the worst smile by both specialists and residents.

These results were expected since case 9 represented the recommended aesthetics guidelines and case 5 represented a clear deviation from the recommended aesthetics guidelines [3,7-9].

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