The perception of dental esthetics assessed by Prosthodontic Residents and UAE recognized Specialists in Prosthodontics.

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By

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ABSTRACT

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.

Materials and 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.

Results

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 (l**o**ng 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.

DEDICATION

This thesis is dedicated to my parents and my brothers and sister

For their endless love, support and encouragement

DECLARATION

I declare that all the content of the thesis is my own work. There is no conflict of interest with any other entity or organization.

Name: Noura Alhassani

Signature:

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1.0 INTRODUCTION

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.[1]

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 [2]. More conservative treatments have become common since veneers were introduced in the 1980s as an alternative technique to full coverage crowns [2].

Publications by Simonsen, Calamia and Horn[2, 3], 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.[4]

Calamia and Horn [2,3], 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. (Beier 2012).

Layton et al (2012) 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 are 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 (1998)[5] found that esthetically pleasing tooth restorations were positively correlated with a patient's self-esteem and quality of life. Van der Geld et al (2007)[6], 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.

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 (Kokich, 1999[7], Dong, 1999 Dunn 1996, Hasanreisoglu, 2005)[8].

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 2.5year [9]. 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.[10]

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.[2, 3, 11]

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.

2.0 Literature Review

This chapter consists of two sections. The first section provides a brief overview of the adhesion complex of the tooth, luting composite and porcelain. The second section discusses the aesthetic characteristics of porcelain veneers.

2.1 Adhesion complex tooth/luting composite/porcelain

The porcelain veneer technique includes the bonding of a thin porcelain laminate to the tooth surface using adhesive techniques and a luting composite in order to change the color, form and /or position of anterior teeth. The success of the porcelain veneer is greatly determined by the strength and durability of the formed bond between the three different components of the bonded veneer complex, as there are the tooth surfaces, the luting composite and the porcelain

veneer.

2.1.1 Tooth Surface

Concepts regarding the preparation of teeth for porcelain veneers have changed over the past few years. Although early concepts suggested minimal or no tooth preparation[3, 12-15] current beliefs support removal of varying amounts of tooth structure. [12, 16-21]

Enamel reduction is required to improve the bond strength of the resin composite to the tooth surface. [22-24] The aprismatic top surface of mature unprepared enamel, which is known to offer only a minor retention capacity, is removed. In addition, care must be taken to maintain the preparation completely in enamel to realize an optimal bond with the porcelain veneer. [25] Although the results of the newest generation dentine adhesive systems are very promising,

the bond strength of porcelain bonded to enamel is still superior when compared with the bond strength of porcelain bonded to dentine. [26, 27]

The vast majority of teeth receiving porcelain laminate veneers should have some enamel removal, usually approximately 0.5mm, which allows for the minimal thickness of porcelain. Christensen[28] states that 0.75mm is the optimum amount of enamel that should be removed. According to Ferrari et al.[29], however, the extent and thickness of enamel in the gingival area of anterior teeth does not permit a reduction of 0.5mm without encroaching upon the dentine. In addition, Natress et al.[30] found that in case of freehand preparation, the proximal and cervical enamel was reduced more than 0.5mm in the vast majority of cases with exposure of dentine in most teeth.

If dentine is exposed, protection is recommended for the period between preparation and cementation in order to prevent post-operative sensitivity and bacterial invasion.[31,32] The temporary materials (resin composite or acrylic resin) currently in use only partially seal the surface.[33,34] More effectively, the exposed dentine can be protected by means of a primer, which is a hydrophilic reactive monomer in an organic solvent.[35,36] The use of these primers or desensitisers after preparation seems not to deteriorate adhesion to dentine when the exposed dentine surface is adequately re-treated at the final appointment prior to the actual cementation.[37] Paul and Scharer [38] proposed the application of the dentine bonding agent immediately after completion of tooth preparation. This new dentine bonding agent application technique may prevent the development of bacterial leakage and dentine sensitivity during the temporary phase, and the technique is associated with improved bond strength in vitro. If temporary resin veneers must be placed for aesthetic and/or phonetic reasons, it is indicated to use a eugenol free temporary cement in order to maintain the original bond strength.[39] Alternatively temporary veneers may be constructed in composite, held in place by a small area of etched enamel.[16, 19]

Regarding the incisal preparation, three basic types of preparation have been described namely, the window or intra enamel preparation, the overlapped incisal edge preparation and the feathered incisal preparation. Several authors favoured the overlapped incisal preparation.[18, 19, 28] With this type of incisal preparation; the dental technician has more control on the aesthetic characteristics of the incisal part of the porcelain veneer. In addition, this preparation will make the restoration more resistant to incisal fractures. Highton et al. [40]confirmed this latter statement in vitro using two dimensional photo elastic stress analysis. This type of preparation distributed the occlusal load over a wider surface area and, consequently, reduced the concentration of the stress within the veneer. But the vitro study done by Hui et al.[41] and Gilde et al.[42] demonstrated that an overlap porcelain veneer design will transmit maximum stress on the veneer and increase the risk of cohesive fracture. A window design prepared entirely into enamel withstood axial stress most favourably in this investigation. They concluded that where strength is an important requisite, the most conservative type of veneer, namely the window preparation, was the design of choice. However, in the clinical study of Meijering et al.[43] no relation was seen between survival and incisal preparation design for both indirect resin composite and porcelain veneer after 2.5 years of clinical functioning. Further in vivo studies have to point out if a similar result would be noticed in the long term.

2.1.2 Porcelain Veneer

Veneers are mainly fabricated from conventional low fusing feldspathic porcelain. Two methods for fabrication of these porcelain veneers have been described: the platinum foil technique [3, 16, 44] and the refractory die rechnique.[16] At present the refractory die technique is preferred to the platinum foil technique in most laboratories.[45]

By etching the inner side of the porcelain veneer with hydrofluoric acid (9% _12%) and subsequently silanizing the etched surface, the bond strength of a luting composite to the etched porcelain surface has been measured to be higher than the bond strength of a luting composite to etched enamel and even exceeding the cohesive strength of the porcelain itself.[11, 24, 46-49] Etching the inner side of the porcelain veneer with hydrofluoric acid creates a retentive etch pattern. SEM of the etched porcelain surface showed an amorphous micro structure with numerous porosities.[46, 49-52] the micro porosities increase the surface area for bonding and lead to a micro mechanical interlocking of the resin composite. Several factors like the etching time, concentration of the etching liquid, fabrication method of the porcelain restoration,[2,46] and the type of porcelain[53,54] determine the micro morphology of the etch pattern and consequently the bond strength of the resin composite to etched porcelain.

In addition to micro porosities, micro cracks were observed that grow when the etching time is increased.[51] Although, not significantly, a decrease in the flexural strength of the etched porcelain occurs. Weakening of the porcelain by etching was also noted in other in vitro studies.[55, 56]

Ultrasonic cleaning of etched porcelain in 95% alcohol, acetone or distilled water is indicated to remove all residual acid and dissolved debris from the surface. Inadequate rinsing after etching the porcelain surface may leave re-mineralized salts, which can be recognized as a white residue or deposit.[57] Some authors [52,58] studied the etch patterns of hydrofluoric acid on

feldspathic porcelain with SEM and concluded that the best surface, in terms of penetrability, was obtained by immersion of the etched porcelain in an ultrasonic bath. Aida et al.[59] however, observed no significant differences in surface morphology and bond strength between etched feldspathic porcelain with and without ultrasonic cleaning.

Silanization of etched porcelain with a bi-functional coupling agent provides a chemical link between the luting resin composite and porcelain. A silane group at one end chemically bonds to the hydrolysed silicon dioxide at the ceramic surface, and a methacrylate group at the other end copolymerizes with the adhesive resin. Single component systems contain silane in alcohol or acetone and require prior acidification of the ceramic surface with hydrofluoric acid to activate the chemical reaction with two component silane solutions, the silane is mixed with an aqueous acid solution to hydrolyse the silane, so that it can react directly with the ceramic surface. If not used within several hours, silane will polymerise to an unreactive polysiloxane.[60] Several authors reported differences in bond strength dependent on the silane treatment used.[47, 48, 53, 58] In addition, heating of the silane coated porcelain to 100 C resulted in a bond strength twice as high than if no heating was used.[54]

The bond strength of resin composite to a pre-treated ceramic restoration has been described to be negatively influenced by external factors like water sorption,[54] thermocycling,[24,61] and fatigue.[62] Contamination of the pre-treated surface with die stone,[63] latex gloves,[64] saliva,[48,61] silicone-based fit checker paste,[65,66] and try-in paste[67] will also lower the bond strength. Several cleaning methods were proposed to restore the original bond strength. In case of contamination with saliva, re-etching the inner side of the porcelain with 37% phosphoric acid restored the bond strength. Acetone cleaning, after removal of the try-in paste, produced a marked reduction in bond strength.[63, 58] This cleaned surface had to be silanated again to strength.[67] A decreased bond strength due to contamination with fit- restore the original bond checker paste was restored by re-etching and silanising the porcelain surface, [66] whereas

Sheth et al.[65] reported that the original bond strength could not be restored due to chemical contamination of the porcelain surface.

2.2 Aesthetic characteristics and porcelain veneer

There is a general agreement among practitioners that porcelain veneers will continue to play a vital role in elective dental aesthetics. This places high demands on predictability, especially with color matching and masking methods. The final shade of the veneer depends not only on the color, opacity and thickness of the porcelain but also on the color of the underlying tooth and the color and thickness of the luting composite.[68-73]

Color matching of one discolored tooth with a porcelain veneer to the surrounding natural teeth must be considered as most difficult. It is impossible to mask a strong discoloration by a thin layer of porcelain (0.3-0.7mm) without making the restoration opaque and lifeless. Consequently, the restored tooth will never have the same translucency as the surrounding natural teeth.[16, 17,44,57,74]

Regarding the aesthetics (color stability and surface smoothness) of porcelain veneers after several years of clinical functioning, all clinical studies confirmed the maintenance of aesthetics of porcelain veneers in the short term and in the medium to long term. In addition, patient acceptance of porcelain veneers in these clinical studies was high. The percentage of patients that were completely satisfied with the porcelain veneers varied from 80 to 100%. Some studies even reported an increase in patient satisfaction after several years[75, 76]. This increase was explained by the habituation of the patients to the aesthetic improvement of their dentition with porcelain veneers.

2.3 CONCLUSION

The adhesive porcelain veneer complex appears to be a very strong complex. An optimal bond is obtained if the preparation is located completely in enamel, if correct surface treatment procedures are carried out and if a suitable composite luting agent is selected.

However, from an aesthetic and periodontal point of view a complete intra-enamel preparation cannot always be realized. The quality of the preparation was inferior if dentine was exposed to a large extent, as the current dentin bonding agents are not yet able to prevent microleakage at the dentin margins in the long term.

The periodontal response to porcelain veneers varies from clinically acceptable to excellent. Regarding the aesthetic properties of the porcelain veneers, these restorations maintained their aesthetic characteristics in the medium to long term and patient satisfaction was high.

The major shortcoming of porcelain veneers is the relatively wide marginal discrepancy. At these marginal openings the luting composite is exposed to the oral environment and the wear resistance of the composite luting agents was sub-optimal.

Nevertheless, these shortcomings had no direct impact on the success of porcelain veneers in the medium term; however, their influence on the overall clinical performance in the long term is still unknown.

3.0 AIMS

The purpose of this quantitative study with descriptive design was to assess the dental esthetic perception and smile design by a group of residents and UAE recognized specialists in prosthodontics.

4.0 MATERIALS AND METHODS

4.1 Study Design and Location

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 total of 25 clinicians were selected from UAE recognized Specialists in prosthodontics and prosthodontic residents from Hamdan Bin Mohamed College of Dental Medicine. Two images of teeth were taken, i) Smiling and ii) Retracted.

4.2 Questionnaire Design

Demographic data collected from each participant included:

I. Gender

II. Age

III. The country of graduation

IV. The country of post-graduate qualification

V. Experience in practice (years) after graduation

VI. Experience in practice (years) after post-graduation

VII. Country of current practice

No names or other identifying information were collected, as the questionnaire was completely anonymous.

A questionnaire of ten cases for rating the aesthetics of each case was developed:

Case 1: Gummy smile with visible lower teeth

Case 2: Flat incisal plane not following the lower lip line

Case 3: Square teeth with flat incisal plane

Case 4: Half-crown visible

Case 5: Midline discrepancy

Case 6: Incisal plane following lower lip line

Case 7: Good incisal curvature following the lip line with very white teeth

Case 8: Visible gum papillae following the lip curvature and no contact with the lower lip

Case 9: Long teeth contacting the lower lip

Case 10: Gingivitis

Each case had 7 questions, with ratings from poor to excellent. The questionnaires distributed among the prosthodontic residents in HBMCDM, specialists in prosthodontics in HBMCDM and other dental clinics. Respondents were asked to evaluate the dental esthetics of each case.

4.3 Clinical procedure and types of veneer appearance.

Two photographs were taken under natural light of patients who have had at least two veneers on the anterior teeth. Images were taken with the patients i) smiling and ii) with retracted cheeks. A questionnaire was distributed among the prosthodontics residents and the UAE recognized specialists in prosthodontics to evaluate and compare the dental aesthetic patterns of porcelain laminate veneers (Appendix 2).

A total of 10 cases were evaluated by each clinician. The different clinical situations were as follows:

Case 1: Gummy smile with visible lower teeth.

Case 2: Flat incisal plane not following the lower lip line.

Case 3: Square teeth with flat incisal plane.

Case 4: Half-crwns visible.

Case 5: Midline discrepancy.

Case 6: Incisal plane following lower lip line.

Case 7: Good incisal curvature following the lower lip line with very white teeth.

Case 8: visible gum papillae following the lower lip curvature and no contact with lower lip.

Case 9: Long teeth contacting the lower lip.

Case 10: 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. Each case was evaluated using a Likert scale from (poor to excellent) based on the appearance of the smile, coded as poor=1, average=2, good=3, very good=4, excellent=5.

4.4 Questionnaire design and Data Collection

The first part of the questionnaire consisted of demographical information such as the age, gender of the participant, educational country, occupation and experience. The second part consisted of two images of each case and each of the ten cases consisted of seven questions. The responses for the questions were rated as (1) poor, (2) average, (3) good, (4) very good and (5) excellent on a Likert scale.

The questionnaire was conducted by distributing it directly to each resident and to the UAE recognized specialist in prosthodontics.

4.5 Participants in the study

Questionnaires of ten cases of patients with anterior veneers were distributed among UAE recognized specialists in prosthodontics and prosthodontic residents who were asked to evaluate the dental aesthetics and smile design. The questionnaires aim was explained directly by me to 12 prosthodontic residents in Hamdan Bin Mohamed College of Dental Medicine and 13 UAE recognized specialists in prosthodontics. Regarding the specialists, I distributed the questionnaires to the prosthodontists in HBMCDM, and an arranged appointment with Dr.Yousif, head of Sharjah Dental Center. I discussed the questionnaires

and the distribution process with him. He suggested names of prosthodontists working in the Ministry of Health in Sharjah, Ras Al Khaima and Dubai, as well as in private clinics in Sharjah and Dubai. Dr. Moosa also suggested some names of his prosthodontics colleague in DHA. I met each prosthodontist directly and gave them the questionnaire. There were 3 prosthodontists in HBMCDM, 3 from private clinics, 2 from DHA and 5 prosthodontists from the Ministry of Health in UAE. 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.

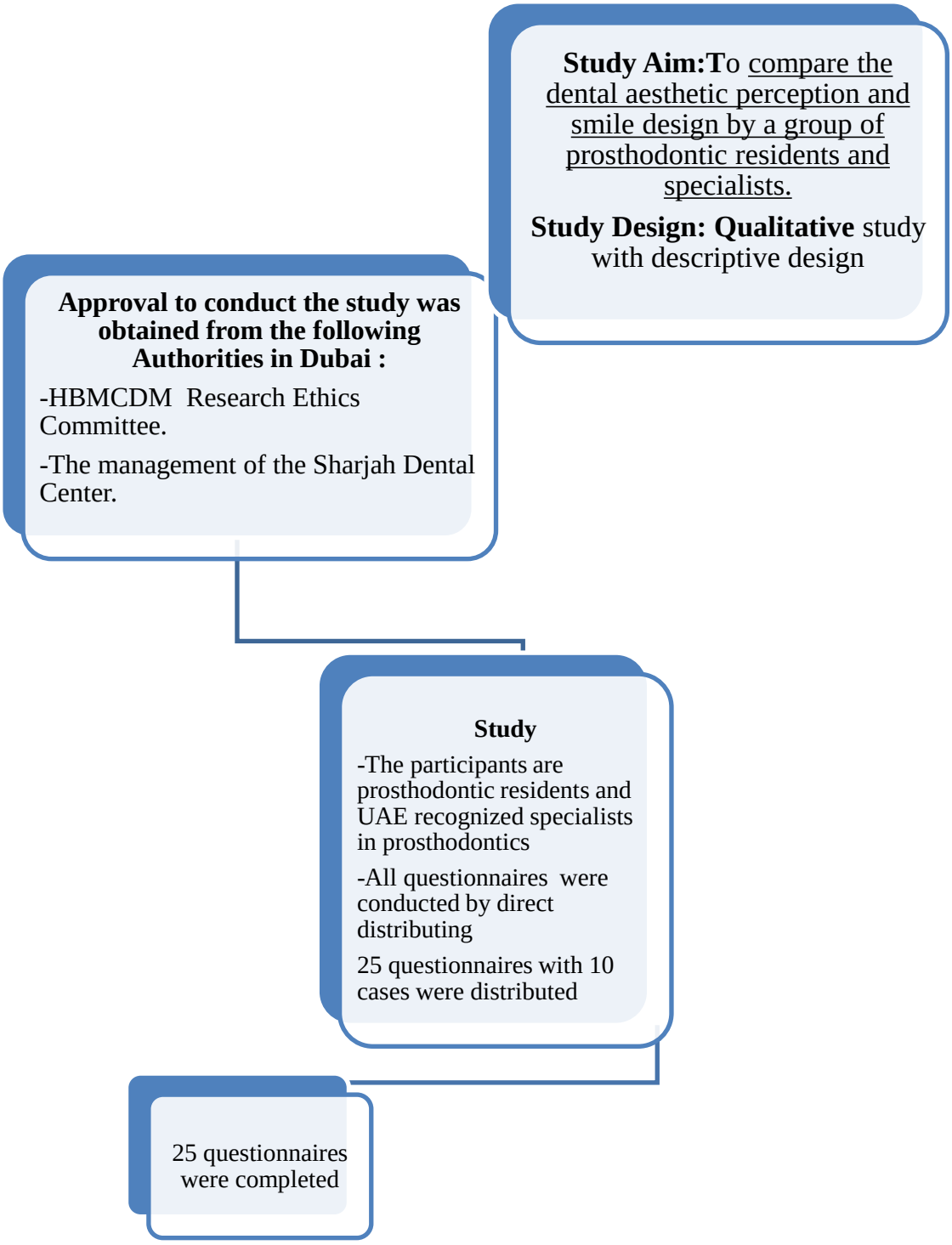

Figure1: A summary flow chart of study methodology

4.6 Statistical Analysis

Data were entered in the computer using SPSS for Windows version 20.0 (SPSS Inc., Chicago, IL). Results were cross-tabulated to examine the independency between variables. Statistical analysis was performed using X^2(Chi square) or Fisher's exact test as appropriate.to test for association Where two or more continuous independent variables were examined, t-test and analysis of variance were used. An ANOVA frequency tables' bar and lines graphs were performed as descriptive statistics. Logistic regression was used to explain factors of knowledge. A p-value of less than 0.05 was considered significant in all statistical analysis. There were ten cases each with 10 questions to be evaluated by the participant and the score of knowledge was calculated for each of them, a cutoff point was considered on function of the accumulation of the score of participant by plotting the data on a normal distribution curve, this was applied also to both practice and attitude.

4.7 Ethical Considerations

This study was conducted in full conformance with the principles of the "Declaration of Helsinki", Good Clinical Practice (GCP), and within the laws and regulations of the UAE/Dubai Healthcare City. The ethical approval was obtained from the Research Ethics Committee at the Hamdan Bin Mohammed College of Dental Medicine, Mohammed Bin Rashid University.

5.0 RESULTS

Twenty-five prosthodontists (12 prosthodontic residents and 13 UAE recognized specialists in prosthodontics) evaluated ten veneer cases. Of the 25 dentists, 40% were from the United Arab Emirates and 60% from other countries. The resident's age ranged from 25 to 31 years old, while the age range of the UAE recognized specialists was from 33 to 64 years.

5.1 Study Sample Characteristics

Table 1: Demographic characteristics, age, educational level, experience and current practice of the participant:

Table 1: Characteristics of all the responding prosthodontists

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

Table 2: Mean age of participants.

Type	Mean age (years)	N	SD
Resident	29.42	12	1.8
Specialist	43.00	13	9.2
TOTAL	36.48	25	9.6

P<0001

The characteristics of the prosthodontic residents and the UAE recognized specialists in prosthodontics are summarized in Table 1.

As shown in the Table 1: Ten (40%) of the participants were male, while 15 (60%) were female. Regarding the country of undergraduate studies14 (63.6%) of the participants were from Arabic countries, 4 (18.2%) were from Asia, and the rest 4 (18.2%) of the participants were from Western countries. Regarding the country of postgraduate study, 15(60%) of the participants were from the UAE and 10 (40%) were from other countries. The mean age of the participants was 36.48 years.

Table 3: Test of the normality of the score of the response per case

	Kolmogorov-Smirnova			Shapiro-Wilk		
Tests of Normality for the score of	Statistic	df	Sig.	Statistic	df	Sig.
Case1	0.115	25	.200*	0.983	25	0.938
Case2	0.103	25	.200*	0.962	25	0.455
Case3	0.126	25	.200*	0.957	25	0.361
Case4	0.175	25	0.046	0.944	25	0.187
Case5	0.195	25	0.016	0.891	25	0.012
Case6	0.142	25	.200*	0.962	25	0.454
Case7	0.16	25	0.098	0.962	25	0.463
Case8	0.124	25	.200*	0.966	25	0.552
Case9	0.11	25	.200*	0.975	25	0.761
Case10	0.17	25	0.06	0.802	25	<0.000

The Kolmogorov – Smirnova statistic was used to assess for normal distribution of the responses for all the 10 images. All the seven scores for each case were amalgamated to form an overall score. This was also applied for the analysis in table 4 which looked for possible differences in responses by gender.

5.2 Overall or consolidated score for each case by demographic variables.

Table 4: 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 Female	10 15	15.2(3.35) 14.4667(4.09)	0.64
Case 2	Male Female	10 15	16(5.66) 16.6(5.85)	0.801
Case 3	Male Female	10 15	13.6(5.06) 14.4667(4.02)	0.638
Case 4	Male Female	10 15	17.2(5.2) 15.9333(4.94)	0.544
Case 5	Male Female	10 15	9.1(3.21) 10.4(2.32)	0.251
Case 6	Male Female	10 15	18.9(4.15) 19.0667(5.51)	0.936
Case 7	Male Female	10 15	16.8(3.85) 15.8(5.33)	0.615
Case 8	Male Female	10 15	22.7(4.83) 16.7333(4.51)	*0.004
Case 9	Male Female	10 15	22.1(6.35) 19.1333(5.71)	0.236
Case 10	Male Female	10 15	11.9(6.43) 10.8(2.59)	0.556

Only case 8 showed a difference in response according to gender (p=0.004).In case 8 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.

Table 5: Comparison of the overall or consolidated score of the responses for each case by age group

Score of responses from	Age group	Number	Mean (sd)	p-value
Case 1	25-39 40 and above	17 8	14.41 (3.94) 15.5(3.46)	0.511
Case 2	25-39 40 and above	17 8	16.35(5.66) 16.38 (6.07)	0.993
Case 3	25-39 40 and above	17 8	14.35 (5.00) 13.63 (2.88)	0.707
Case 4	25-39 40 and above	17 8	16.24 (4.71) 16.88 (5.79)	0.771
Case 5	25-39 40 and above	17 8	9.59 (2.55) 10.5 (3.160	0.447
Case 6	25-39 40 and above	17 8	18.82 (4.79) 19.38 (5.50)	0.800
Case 7	25-39 40 and above	17 8	15.53 (5.09) 17.63 (3.78)	0.312
Case 8	25-39 40 and above	17 8	18.76 (5.39) 19.88 (5.82)	0.644
Case 9	25-39 40 and above	17 8	19.47 (6.49) 22.13 (4.76)	0.314
Case 10	25-39 40 and above	17 8	11.06 (4.84) 11.63 (3.74)	0.773

There were no statistical differences in overall scores according to the age of the respondents.

Table 6: Comparison of the score of the responses by type of doctors

	Type	Number	Mean (sd)	p-value
Case 1	Resident Specialist	12 13	13.83(3.61) 15.62(3.82)	0.244
Case 2	Resident Specialist	12 13	15.92 (6.22) 16.77 (5.33)	0.715
Case 3	Resident Specialist	12 13	15.83 (4.91) 12.54 (3.26)	0.058
Case 4	Resident Specialist	12 13	16.92 (5.48) 16 (4.62)	0.655
Case 5	Resident Specialist	12 13	9.5 (2.50) 10.23 (2.98)	0.515
Case 6	Resident Specialist	12 13	18.5 (5.40) 19.46 (4.59)	0.635
Case 7	Resident Specialist	12 13	15.33 (5.45) 17 (4.02)	0.391
Case 8	Resident Specialist	12 13	18.25 (5.53) 19.92 (5.44)	0.454
Case 9	Resident Specialist	12 13	19.08 (7.24) 21.46 (4.65)	0.335
Case 10	Resident Specialist	12 13	11.33 (5.53) 11.15 (3.39)	0.922

There were no statistical differences in overall scores for any of the cases according to whether a resident or a qualified specialist in prosthodontics.

Table7: Comparison of the overall or consolidated score of the responses by country of postgraduate study.

	Postgraduate	N	Mean (sd)	p-value
Case 1	UAE	15	14.6 (4.17)	0.800
	Others	10	15 (3.23)	
Case 2	UAE	15	15.4(5.94)	0.309
	Others	10	17.8(5.18)	
Case 3	UAE	15	14.93(4.76)	0.264
	Others	10	12.9(3.63)	
Case 4	UAE	15	16.13(5.14)	0.714
	Others	10	16.9(4.93)	
Case 5	UAE	15	9.67(2.61)	0.642
	Others	10	10.2(3.01)	
Case 6	UAE	15	18.47(4.94)	0.518
	Others	10	19.8(5.03)	
Case 7	UAE	15	15.07(4.91)	0.146
	Others	10	17.9(4.12)	
Case 8	UAE	15	18.47(5.13)	0.473
	Others	10	20.1(6.01)	
Case 9	UAE	15	19.33(6.81)	0.326
	Others	10	21.8(4.54)	
Case 10	UAE	15	11.67(5.05)	0.568
	Others	10	10.6(3.50)	

Overall scores per case were no different according to country of postgraduate study.

Table 8: Comparison of the overall or consolidated score of the responses by country of undergraduate study

		Number	Mean	p-value
Case 1	Arabic countries	14	14.43 (2.95)	0.630
	Asia	4	16(6.48)	
	Western	4	16.25(4.35)	
	Total	22	15.05(3.85)	
Case 2	Arabic countries	14	16.21(6.38)	0.749
	Asia	4	14.75(3.10)	
	Western	4	17.75(2.99)	
	Total	22	16.23(5.35)	
Case 3	Arabic countries	14	15(5.05)	0.511
	Asia	4	12.25(3.30)	
	Western	4	13.25(2.22)	
	Total	22	14.18(4.40)	
Case 4	Arabic countries	14	16.57(4.96)	0.094
	Asia	4	12.5(2.38)	
	Western	4	20.5(6.25)	
	Total	22	16.55(5.26)	
Case 5	Arabic countries	14	9.57(2.53)	0.317
	Asia	4	9.75(3.10)	
	Western	4	12(3.37)	
	Total	22	10.05(2.80)	
Case 6	Arabic countries	14	19.14(4.79)	0.771
	Asia	4	17.75(4.99)	
	Western	4	20.25(5.19)	
	Total	22	19.09(4.71)	
Case 7	Arabic countries	14	16.29(5.09)	0.536
	Asia	4	14.25(5.91)	
	Western	4	18.25(3.20)	
	Total	22	16.27(4.90)	
Case 8	Arabic	14	19.14(5.02)	0.973

	countries			
	Asia	4	18.75(7.89)	
	Western	4	19.75(7.93)	
	Total	22	19.18(5.80)	
Case 9	Arabic countries	14	21.07(6.83)	0.399
	Asia	4	17(4.97)	
	Western	4	22.75(3.77)	
	Total	22	20.64(6.16)	
Case 10	Arabic countries	14	11.5(5.14)	0.896
	Asia	4	11.75(2.75)	
	Western	4	12.75(4.11)	

The country of undergraduate study did not influence the overall score for any of the images.

Each category was converted into codes 1 --→ 5 (poor to excellent) then a mean determined. The maximum value per case is 35 (7x5). The mean percentage was gained by dividing the sum total by 35 and multiplying by 100.

Figure 2: Rank of the overall appearance by case.

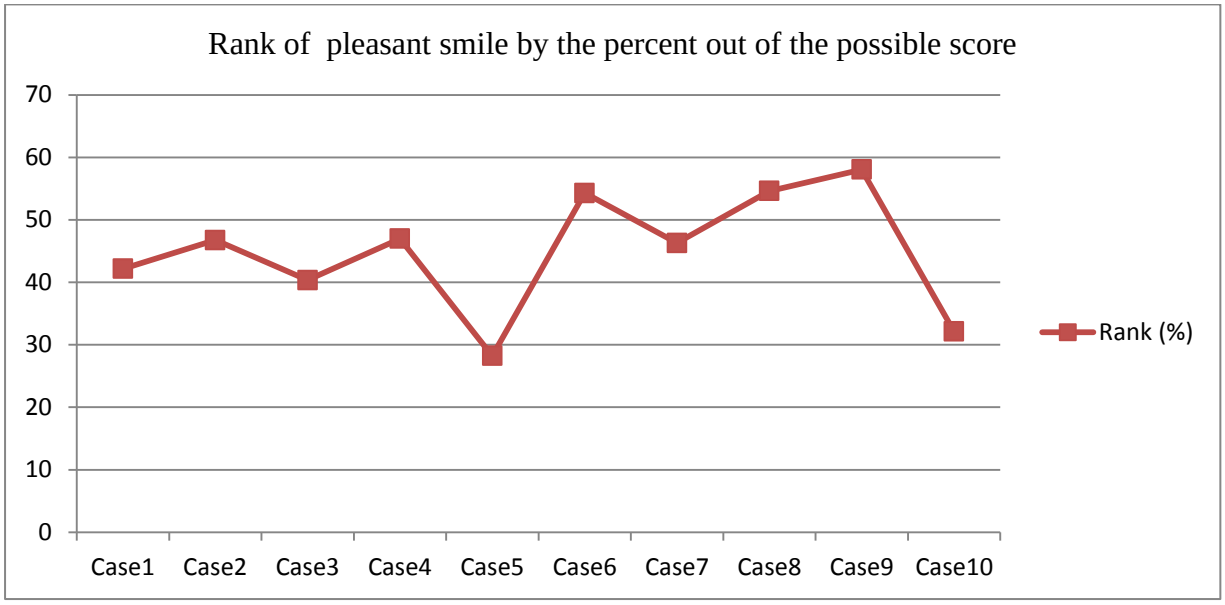

Figure 2 shows the rank of the best and worst smile chosen by the participants. The specialists in prosthodontics and residents both agreed that case 9 which showed long teeth contacting the lower lip, is the most pleasant smile, while case 5 which shows a midline discrepancy was rated worst. Images 6 and 9 were the most pleasing overall, where images 5 and 10 were the most displeasing.

5.3 Appearance of the smile

In the case with gummy smile and lower teeth visible (case1), there was no significant difference in the response between prosthodontic residents and UAE recognized specialists in prosthodontics. Both agreed with this case evaluation, that the appearance was poor. On the other hand, in the clinical case of the flat incisal plane not following the lower lip line (case 2), the evaluation of the appearance of the smile varied from poor to good by the specialist and the resident but the difference was not significant. Furthermore, there were no significant differences in the evaluation of the smile appearance in the case of the square teeth with flat incisal plane (case3). The smile appearance was considered as average by both investigators and only one resident considered the smile appearance to be very good. In addition, the evaluation of the patient smile showed no statistically difference between the resident and the specialist: this appearance was evaluated as poor by the majority in a midline discrepancy situation (case5). In the image of unseen papillae and teeth following the lower lip curvature and no contact with the lip (case8), the smile was considered to be good and finally, in case of gingivitis (case10), the smile appearance was evaluated as poor.

5.4 Overall questions

Each respondent was asked 7 questions rating the appearance of 10 images. A summary of the questions and results of the answers of the participant to each question are presented below. Each case will be summarized in one table:

The Chi-Square in case 1, question 1, show that there were no significant differences in the response between the prosthodontic residents and the UAE recognized specialists. Both agreed with the case evaluation concerning the appearance of the veneers.

In case 3, 9 of 13 specialists thought that the shape and contour of the veneers were poor while 3 of 12 residents rated it poor. A tendency towards significant difference (P=0.083) in the aesthetic perception of the veneers was found between the prosthodontics resident and the specialists. 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 was no significant difference in the aesthetic perception between the prosthodontic residents and the UAE recognized specialist in prosthodontics in case 5, as they both agreed with the case evaluation. There was similar agreement for case 7.

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.

5.5. Responses to all 7 questions for each case image.

The following sections tabulate responses to individual cases and questions regarding appearance. Not all tables are shown as many results were not significant.

Examples of cross tabulation are shown per case and certain questions.

5.5.1 Case1 Gummy smile and visible lower anterior teeth

Table 9: Responses to case1 question 1 (Gummy smile and visible lower teeth).

Type	Poor	Average	Good	Total
Resident	6	5	1	12
Specialist	4	6	3	13
Total	10	11	4	25

Table 10: Chi-Square Tests: Case1 question 1 (Gummy smile and visible lower teeth)

	Value	Default	Asymp.Sig. (2-sided)
Pearson Chi-Square	1.453a	2	0.484
Likelihood Ratio	1.500	2	0.472
Linear-by-Linear Association	1.376	1	0.241
N of Valid Cases	25		

The Chi-Square in case 1, which showed a case with gummy smile and visible lower teeth , there were no significant differences in the response between the prosthodontics residents and the UAE recognized specialists in prosthodontics, both agree with this case evaluation.

Table 11: Responses to case1 question2 (Gummy smile and visible lower teeth)

Type	Poor	Average	Good	Very good	Total
Resident	1	5	5	1	12
Specialist	1	6	3	3	13
Total	2	11	8	4	25

There were no significant differences in the case evaluation by prosthodontic residents and UAE recognized specialists in prosthodontics, as both agreed with the evaluation which was from average to very good, 2 of the participants rated it as poor and none of the participants rated it as excellent.

Table 12: Responses to case1 question 3 (Gummy smile and visible lower teeth)

Type	Poor	Average	Good	Total
Resident	3	6	2	12
Specialist	3	7	1	13
Total	6	13	3	25

There were no significant differences in question 3 evaluations by prosthodontic residents and the UAE recognized specialists in prosthodontics, as most of them evaluated it from poor to good and none rated it as very good or excellent.

Table 13: Responses to case1 question 4 (Gummy smile and visible lower teeth)

Type	Poor	Average	Good	Very good	Total
Resident	5	3	3	1	12
Specialist	0	4	9	0	13
Total	5	7	12	1	25

There are no significant differences in question also as the evaluations and the opinion of both the prosthodontic residents and the UAE recognized specialists in prosthodontics was the same, which is mostly evaluated as average and good and only one resident rated it as very good and no participant rated it as excellent .

Table 14: Responses to case1 question 5 (Gummy smile and visible lower teeth)

Type	Poor	Average	Good	Very good	Total
Resident	3	5	3	1	12
Specialist	3	6	3	1	13
Total	6	11	6	2	25

Most of the prosthodontics residents and the UAE recognized specialists in prosthodontics rated this question between poor to good, only 2 of the participant's rated it as very good, and none of them rated it as excellent.

Table 15: Responses to case1 question 6 (Gummy smile and visible lower teeth)

Type	Poor	Average	Good	Very good	Total
Resident	4	4	3	1	12
Specialist	2	6	3	2	13
Total	6	10	6	3	25

In question 6 the participant's evaluation was from poor to good and none of them rated this as excellent.

Table 16: Responses to case1 question 7 (Gummy smile and visible lower teeth)

Type	Poor	Average	Very good	Total
Resident	4	4	1	12
Specialist	2	6	2	13
Total	6	10	3	25

In question 7 most of the prosthodontics residents and the UAE recognized specialists in prosthodontics evaluate it as poor and average, only 3 of them rated it as very good, and none of the participants rated it as good or excellent.

5.5.2 Case2 Flat incisal plane not following the lower lip line

In case 2 showing flat incisal plane not following the lower lip line , both the prosthodontic residents and the United Arab Emirates recognized specialists in prosthodontics agreed with most questions in this case evaluation and the P value is >0.05

Table 17: Responses to case 2, question 1 (Flat incisal plane not following the lower lip line)

Type	Poor	Average	Good	Very good	Excellent	Total
Resident	4	2	4	1	1	12
Specialist	3	4	4	2	0	13
Total	7	6	8	3	1	25

There are no significant differences in the case evaluation between the prosthodontic residents and the UAE recognized specialists in prosthodontics, as both agreed with the evaluation which is from poor to good, and only one of the residents rated it as excellent.

Table 18: Responses to case 2, question 2 (Flat incisal plane not following the lower lip line)

Type	Poor	Average	Good	Very good	Total
Resident	3	6	2	1	12
Specialist	3	7	1	2	13
Total	6	13	3	3	25

There are no significant differences in question 2 evaluations between the prosthodontic residents and the UAE recognized specialists in prosthodontics, as both agreed with the evaluation which is mostly evaluated as poor and average and none rated it as excellent.

Table 19: Responses to case 2, question 3 (Flat incisal plane not following the lower lip line)

Type	Poor	Average	Good	Total
Resident	3	8	1	12
Specialist	4	6	3	13
Total	7	14	4	25

There are no significant differences in question 3 also as the evaluations and the opinion of both the prosthodontics residents and the UAE recognized specialists in prosthodontics was the same, which is mostly evaluated as average and no one rated it as very good or excellent and few of them rated it as good.

Table 20: Responses to case 2 question 5 (Flat incisal plane not following the lower lip line)

Type	Poor	Average	Good	Very good	Total
Resident	3	4	4	1	12
Specialist	1	5	5	2	13
Total	4	9	9	3	25

Table 21: Responses to case 2 question 6 (Flat incisal plane not following the lower lip line**)**

Type	Poor	Average	Good	Very good	Total
Resident	1	3	5	3	12
Specialist	1	3	6	3	13
Total	2	6	11	6	25

In both question #5 and #6 also both of the prosthodontics residents and the UAE recognized specialists in prosthodontics was agree with the statistical evaluation of the case, most of them their evaluation was from average to very good, and no one of them rated it as excellent.

5.5.3 Case 3 square teeth with flat incisal plane

Table 22: Responses to case 3 question1 (Square teeth with flat incisal plane).

Type	Poor	Average	Good	Vg	Total
Resident	2	5	4	1	12
Specialist	5	5	3	0	13
Total	7	10	7	1	25

Table 23: Chi-Square Tests for the above responses**.**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.392[a]	3	.495
Likelihood Ratio	2.818	3	.421
Linear-by-Linear Association	1.992	1	.158
N of Valid Cases	25		

In question 1,there were no significant differences in the case evaluation from the prosthodontics residents and the UAE recognized specialists in prosthodontics, as both agreed with the evaluation which is from poor to good, 1 of the participants rated it as very good and no one of the participants rated it as excellent.

Table 24: Responses to case 3, question 2 (Square teeth with flat incisal plane)

Type	Poor	Average	Good	Total
Resident	3	6	3	12
Specialist	9	3	1	13
Total	12	9	4	25

Table 25: Chi-Square Tests of the above responses.

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.968[a]	2	.083
Likelihood Ratio	5.165	2	.076
Linear-by-Linear Association	4.220	1	.040
N of Valid Cases	25		

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 ($P<0.014$).

Table 26: Responses to case 3, question 3 (Square teeth with flat incisal plane).

Type	Poor	Average	Good	Vg	Total
Resident	1	7	3	1	12
Specialist	5	6	2	0	13
Total	6	13	5	1	25

Table 27: Chi-Square Tests of the above responses.

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.910[a]	3	.271
Likelihood Ratio	4.536	3	.209
Linear-by-Linear Association	3.186	1	.074
N of Valid Cases	25		

Table 28: Responses to case 3, question 4 (Square teeth with flat incisal plane)

Type	Poor	Average	Good	Vg	Total
Resident	5	3	3	1	12
Specialist	4	8	1	0	13
Total	9	11	4	1	25

Table 29: Chi-Square Tests of the above responses.

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.351[a]	3	.226
Likelihood Ratio	4.862	3	.182
Linear-by-Linear Association	.479	1	.489
N of Valid Cases	25		

In case 3, both question 3 and question 4 show, no significant differences in the statistical evaluation from the prosthodontics residents and the UAE recognized specialists in prosthodontics, as both agreed with the evaluation which is from average to good, 1 prosthodontic resident rated it as very good and none of the participants rated it as excellent.

Table 30: Responses to case 3, question 5 (Square teeth with flat incisal plane)

Type	Poor	Average	Good	Vg	Total
Resident	4	0	7	1	12
Specialist	5	6	1	1	13
Total	9	6	8	2	25

Table 31: Chi-Square Tests of the above responses.

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.588[a]	3	.014
Likelihood Ratio	13.451	3	.004
Linear-by-Linear Association	1.978	1	.160
N of Valid Cases	25		

In case 3, question 5 there were significant difference between the evaluation of the prosthodontic residents and the UAE recognized specialists in prosthodontics ,specialists were unhappier with aesthetics of this case whereas the residents rated the appearance more highly and the P value was $p<0.014$.

Table 32: Responses to case3question 6 (Square teeth with flat incisal plane)

Type	Poor	Average	Good	Vg	Total
Resident	1	8	2	1	12
Specialist	2	9	2	0	13
Total	3	17	4	1	25

Table 33: Chi-Square Tests of the above responses.

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.354[a]	3	.716
Likelihood Ratio	1.745	3	.627
Linear-by-Linear Association	.880	1	.348
N of Valid Cases	25		

Table 34: Responses to case3 question 7 (Square teeth with flat incisal plane)

Type	Poor	Average	Good	Vg	Total
Resident	2	4	4	2	12
Specialist	3	8	2	0	13
Total	5	12	6	2	25

Table 35: Chi-Square Tests of the above responses.

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.167[a]	3	.244
Likelihood Ratio	4.973	3	.174
Linear-by-Linear Association	2.769	1	.096
N of Valid Cases	25		

In case 3, both question 6 and question 7 show, no significant differences in the statistical evaluation from the prosthodontics residents and the UAE recognized specialists in prosthodontics, as both were happier with the aesthetic evaluation ,which is from poor to good, and none of the participants rated it as excellent.

5.5.4 Case 4 Half-crowns visible

In case number 4 in which half of the crown is visible, both the prosthodontics residents and the United Arab Emirates recognized specialists in prosthodontic were in agreement with ratings.

Table 36: Responses to Case 4 question 2 (Half -crowns visible)

Type	Poor	Average	Good	Very good	Total
Resident	2	5	5	0	12
Specialist	3	5	4	1	13
Total	5	10	9	1	25

Table 37: Responses to Case 4 question 4 (Half -crowns visible)

Type	Poor	Average	Good	Very good	Total
Resident	5	2	4	1	12
Specialist	4	6	2	1	13
Total	9	8	6	2	25

Table 38: Responses to Case 4 question 7 (Half -crowns visible)

Type	Poor	Average	Good	Very good	Total
Resident	2	2	7	1	12
Specialist	1	8	3	1	13
Total	3	10	10	2	25

These three tables show the ratings of case number 4. There are no significant differences in the evaluation as both prosthodontic residents and the UAE recognized specialist in prosthodontics have almost the same opinion in this case. (P Value >0.05).

5.5.5 Case 5 Midline discrepancy

In case 5 which show a midline discrepancy were no significant difference in the aesthetics perception between the prosthodontics residents and the UAE recognized specialist in prosthodontics, as they both agreed with the case evaluation.

Table 39: Responses to Case 5 question 1(Midline discrepancy).

Type	Poor	Average	Good	Total
Resident	7	5	0	12
Specialist	9	3	1	13
Total	16	8	1	25

16 of the respondents rated the appearance of the patient smile as poor and 8 of them rated it as average, and no one from the participants rated the appearance as excellent.

Table 40: Responses to case 1 question 2 (Midline discrepancy).

Type	Poor	Average	Total
Resident	9	3	12
Specialist	9	4	13
Total	18	7	25

Most of the participants were unhappy with the shape and contour of the veneer as they rated it from poor to average and no one rated it as good, very good and excellent.

Table 41: Responses to case 5 question 3 (Midline discrepancy).

Type	Poor	Average	Very good	Total
Resident	5	6	1	12
Specialist	7	5	1	13
Total	12	11	2	25

Most of the participants were unhappy with the shade of the veneer as they rated it from poor to average.

Table 42: Responses to case 5 question 4 (Midline discrepancy).

Type	Poor	Average	Good	Total
Resident	8	4	0	12
Specialist	5	7	1	13
Total	13	11	1	25

Most of the participants found that the length/width ratio of the veneer was unsatisfying, as they rated it from poor to average, and only one of the UAE recognized specialist in prosthodontics rated it as good.

Table 43: Responses to case 5 question 5 (Midline discrepancy).

Type	Poor	Average	Total
Resident	7	5	12
Specialist	9	4	13
Total	16	9	25

Most of the participants rated the relationship of the incisal edges to the lower lip as poor to average.

Table 44: Responses to case 5 question 6 crosstab (Midline discrepancy).

Type	Poor	Average	Good	Total
Resident	12	0	0	12
Specialist	11	1	1	13
Total	23	1	1	25

Most of the participants were unhappy regarding the relationship of the soft tissue around the veneer as they rated it as poor.

Table 45: Responses to case 5 question 7(Midline discrepancy).

Type	Poor	Average	Good	Total
Resident	12	0	0	12
Specialist	11	1	1	13
Total	23	1	1	25

Most of the participants agreed with the evaluation of the tooth display and lip position during smile, they rated it as poor.

5.5.6 Case 6 incisal plane following the lower lip line

Case 6 was rated highly pleasing by both residents and specialist prosthodontists.

Table 46: Responses to case 6 question 3 (incisal plane follow the lower lip line).

Type	Average	Good	Very good	Total
Resident	3	8	1	12
Specialist	4	8	1	13
Total	7	16	2	25

Most of the prosthodontic residents and the UAE recognized specialist in prosthodontics totally agreed that the appearance of the patient smile was good.

Table 47: Response to Case 6 question 5 (incisal plane follow the lower lip line).

Type	Poor	Average	Good	Very good	Total
Resident	1	2	7	2	12
Specialist	1	3	6	3	13
Total	2	5	13	5	25

Most of the prosthodontic residents and the UAE recognized specialist in prosthodontics found that the relationship of the incisal edges to lower lip is good and 2 of the participant rated it as poor.

Table 48: Responses to case 6 question 6 (incisal plane follow the lower lip line).

Type	Poor	Average	Good	Very good	Excellent	Total
Resident	2	3	3	3	1	12
Specialist	0	2	8	3	0	13
Total	2	5	11	6	1	25

Regarding the relationship of the soft tissue around the veneer most of the participants agreed that it range from good to very good.

5.5.7 Case 7 good incisal curvatures and follow the lower lip line with very white teeth

Table 49: Responses to case 7 question 7 (good incisal curvature and follow the lower lip line with very white teeth).

Type	Poor	Average	Good	Very good	Total
Resident	1	1	9	1	12
Specialist	1	4	4	4	13
Total	2	5	13	5	25

Regarding the tooth display and the lip position during patient smile, most of the participants agreed that its look good.

In both case 6 and case 7, there were no significant differences in the aesthetic assessment from the prosthodontic residents and the UAE recognized specialists in prosthodontics, as both agreed with the case evaluation.

5.5.8 Case 8 visible papillae following the lower lip curvature and no contact with lip

Table 50: Responses to case 8 question 1(visible papillae following the lower lip curvature and no contact with lip).

Type	Poor	Average	Good	Vg	Total
Resident	2	2	8	0	12
Specialist	2	1	7	3	13
Total	4	3	15	3	25

Table 51: Chi-Square Tests of the above responses.

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.365a	3	0.339
Likelihood Ratio	4.525	3	0.210
Linear-by-Linear Association	0.923	1	0.337
N of Valid Cases	25		

In question 1,there were no significant differences in the case evaluation from the prosthodontics residents and the UAE recognized specialists in prosthodontics, as both agreed that the appearance of the patient smile is good.

Table 52: Responses to case 8 question 2 (visible papillae following the lower lip curvature and no contact with lip).

Type	Poor	Average	Good	Very good	Total
Resident	1	2	7	2	12
Specialist	1	3	6	3	13
Total	2	5	13	5	25

Table 53: Chi-Square Tests of the above responses.

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	0.438[a]	3	.932
Likelihood Ratio	0.440	3	.932
Linear-by-Linear Association	0.001	1	.970
N of Valid Cases	25		

Case 8, question 2 in which the papillary visible following the lower lip curvature and no contact with lip there were no statistical differences in the aesthetic evaluation from the prosthodontics residents and the UAE recognized specialists in prosthodontics, as both agreed that the shade and the contour of the veneers are good, and no one from the participants thought its excellent.

Table 54: Responses to case 8 question 4 (visible papillae following the lower lip curvature and no contact with lip).

Type	Poor	Average	Good	Vg	Total
Resident	3	0	6	3	12
Specialist	0	5	4	4	13
Total	3	5	10	7	25

Table 55: Chi-Square Tests of the above responses.

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.516[a]	3	.036
Likelihood Ratio	11.596	3	.009
Linear-by-Linear Association	.192	1	.661
N of Valid Cases	25		

In case 8, question 4, the Chi-Square was=0.036 a significant difference in the aesthetic perception between the prosthodontic residents and the UAE recognized specialists in prosthodontics, as the residents reported significantly less satisfaction with the appearance than the specialists (P<0.05) 25% of the residents thought it was poor, while none of the specialists thought that it was poor and their evaluation was from good to very good.

Table 56: Responses to case 8 question 5 (visible papillae following the lower lip curvature and no contact with lip).

Type	Poor	Average	Good	Vg	Total
Resident	2	0	9	1	12
Specialist	0	2	6	5	13
Total	2	2	15	6	25

Table 57: Chi-Square Tests of the above responses.

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.238[a]	3	.065
Likelihood Ratio	9.020	3	.029
Linear-by-Linear Association	2.163	1	.141
N of Valid Cases	25		

In case 8, question 5 shows, no significant differences in the statistical evaluation from the prosthodontic residents and the UAE recognized specialists in prosthodontics, as both agreed with the evaluation which is from good to very good, none of the participants rated it as excellent.

5.5.9 Case9 long teeth contacting the lower lip.

Table 58: Responses to case 9 question 1 (long teeth contact the lower lip).

Type	Poor	Average	Good	Vg	Excellent	Total
Resident	2	4	3	2	1	12
Specialist	0	4	7	2	0	13
Total	2	8	10	4	1	25

Most of the participants rated the shape and the contour of the veneers from average to good and only one of the residents thought it excellent.

Table 59: Responses to case 9 question 3 (long teeth contacting the lower lip).

Type	Poor	Average	Good	Vg	Excellent	Total
Resident	2	3	5	0	2	12
Specialist	0	5	2	6	0	13
Total	2	8	7	6	2	25

Table 60: Chi-Square Test of the above responses.

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.765a	4	.019
Likelihood Ratio	15.657	4	.004
Linear-by-Linear Association	.536	1	.464
N of Valid Cases	25		

The prosthodontic residents found the appearance in case 9, question 3 different to specialist in so far , as the residents had a higher spread of opinion compare to the UAE recognized specialist in prosthodontics(P value= P<0.05), none of the specialists found the appearance as poor or excellent. Chi-square test =.019.

Table 61: Responses to case 9 question 7 (long teeth contact the lower lip).

Type	Poor	Average	Good	Vg	Excellent	Total
Resident	2	2	5	2	1	12
Specialist	1	0	6	6	0	13
Total	3	2	11	8	1	25

Most of the participants in question 7 rated the tooth display and lip position during patient smile from good to very good.

5.5.10 Case10 Gingivitis

In case 10 there was no significant differences in the aesthetics assessment between the prosthodontic residents and the UAE recognized specialists in prosthodontics.

Table 62: Responses to case 10 question 1 (Gingivitis).

Type	Poor	Average	Good	Very good	Total
Resident	7	4	1	0	12
Specialist	8	4	0	1	13
Total	15	8	1	1	25

Table 63: Responses to case 10 question 4 (Gingivitis)

Type	Poor	Average	Good	Very good	Total
Resident	6	5	0	1	12
Specialist	5	4	3	1	13
Total	11	9	3	2	25

Table 64: Responses to case 10 question 7 (Gingivitis).

Type	Poor	Average	Excellent	Total
Resident	7	4	1	12
Specialist	6	7	0	13
Total	13	11	1	25

The prosthodontic resident and the UAE recognized specialists in prosthodontics were agreed with the most statistical evaluations in case 10

6.0 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 (2007) [77].

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. [78]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 Calamia(1983) [79] . Long- term (15- and 20-year) retrospective studies indicated that the success rates of veneers are as high as 94% to 95% Friedman(1998) [80]. 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 (Friedman 2005[4], Magne 2000)[81] .

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 (Burden 1995 [82], Katz 1978 [83]). 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[7] 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.[7]

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 (Kokich [7]).

7.0 STUDY LIMITATIONS

The limitations in this current study are as follows

- Some limitations of the study were that the photographs were not standardised.
- Difficulty finding images representing very different clinical presentations and aesthetic ideals.
- Limited number of prosthodontic residents and UAE recognized specialists in prosthodontics.
- Biased sample of the study as the participate chosen was based on a convenience sampling.
- Study design intended to assess the veneers, but in reality the design assessing the aesthetics / smile design.

8.0 CONCLUSIONS

- In this study the prosthodontic residents and the UAE recognized specialists in prosthodontics were mostly in agreement with the case ratings.
- Case 9 with long teeth following the lower lip and low smile line was rated as the most pleasant smile by both specialists and residents.
- Case 5 with a midline discrepancy of more than 3mm, straight incisal plane not following the lower lip and wide incisors was rated as the worst smile by both participants.
- This result was expected since case 9 was the best case which followed the recommended aesthetics guidelines and case 5 deviated the most from the recommended aesthetics guidelines [4, 7, 81].
- The prosthodontic residents mean age was 29.4 years, while the average age of the UAE recognized specialist was 43.0 years, 40% of the participants were from United Arab Emirates, while 60% were from other countries.

9.0 REFERENCES

[1] Peumans B, Van Meerbeek B, Lambrechts P, Vanherle G. Porcelain veneers: a review of the literature. J Dent. 2000; 28:163–177.

[2] Simonsen RJ, Calamia JR. Tensile bond strength of etched porcelain. Journal of Dental Research 1983;62:297 Abstract 1154.

[3] Horn RH. Porcelain laminate veneers bonded to etched enamel. Dental Clinics of North America 1983;27:671–84.

[4] Friedman MJ. Survival rates for porcelain laminate veneers with special reference to the effect of preparation in dentin: a literature review. J Esthet Restor Dent 2012 24:257–265.

[5] Davis LG, Ashworth PD, Spriggs LS. Psychological effects of aesthetic dental treatment. J Dent. 1998 Sep;26(7):547-54.

[6]. Van der Geld P, Oosterveld P, Van Heck G, Kuijpers-Jagtman AM.Smile attractiveness. Self-perception and influence on personality.Angle Orthod. 2007 Sep;77(5):759-65.

[7] 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.

[8] Hasanreisoglu U, Berksun S, Aras K, Arslan I. An analysis of maxillary anterior teeth: facial and dental proportions. J Prosthet Dent. 2005 Dec; 94(6):530-8.

[9] Calamia JR. Clinical evaluation of etched porcelain veneers. American Journal of Dentistry 1989;2:9–15.

[10] Pincus CR. Building mouth personality. Journal of South California Dental Association 1938;14:125_9.

[11] Calamia JR, Simonsen RJ. Effect of coupling agents on bond strength of etched porcelain. Journal of Dental Research 1984;63:179 Abstract 79.

[12] Calamia JR. Etched porcelain veneers: the current state of the art. Quintessence International 1985;1:5–12. Plant CG, Thomas GD. Porcelain facings: a simple clinical and laboratory method. British Dental Journal 1987;163:231–4.

[13] Reid JS, Murray MC, Power SM. Porcelain veneers_ a four year follow-up. Restorative Dentistry 1988; 5:42_55.

[14] McLaughlin G, Morrison JE. Porcelain fused to tooth: the state of the art. Restorative Dentistry 1988; 4:90–4.

[15] Reid JS, Murray MC, Power SM. Porcelain veneers—a four year follow-up. Restorative Dentistry 1988;5:42–55.

[16] Garber DA, Goldstein RE, Feinman RA. Porcelain laminate veneers, Lombourg: Quintessence Publishing Co, 1987.

[17] McComb D. Porcelain veneer technique: a promising new method for restoring strength and esthetics to damaged or discolored teeth. Ontario Dentist 1988;65:25–32.

[18] Weinberg LA. Tooth preparation for porcelain laminates. New York State Dental Journal 1989;5:258.

[19] Nixon RL. Porcelain veneers: an esthetic therapeutic alternative. In: Rufenacht CR, editor. Fundamentals of esthetics, Lombourg: Quintessence Publishing Co, 1990. p. 329–68.

[20] Garber DA. Porcelain laminate veneers: to prepare or not to prepare?. Compendium of Continuing Education in Dentistry 1991;XII:178–82.

[21] Friedman MJ. Augmenting restorative dentistry with porcelain veneers. Journal of the American Dental Association 1991;122:29–34.

[22] Schneider PM, Messer LB, Douglas WH. The effect of enamel surface reduction in vitro on the bonding of composite resin to permanent human enamel. Journal of Dental Research 1981;60:895–900.

[23] Black JB. Esthetic restoration of tetracycline-stained teeth. Journal of the American Dental Association 1982;104:846–51.

[24] Stacey GD. A shear stress analysis of the bonding of porcelain veneers to enamel. The Journal of Prosthetic Dentistry 1993;70:395–402.

[25] Troedson M, De´rand T. Shear stresses in the adhesive layer under porcelain veneers. A finite element method study. Acta Odontologica Scandinavica 1998;56:257–62.

[26] Van Meerbeek B, Peumans M, Gladys S, et al. Three-year clinical effectiveness of four total-etch dentinal adhesive systems in cervical lesions. Quintessence International 1996;27:775–84.

[27] Van Meerbeek B, Perdigao J, Lambrechts P, et al. The clinical performance of adhesives. Journal of Dentistry 1998;26:1–20.

[28] Christensen GJ. Have porcelain veneers arrived? Journal of the American Dental Association 1991;122:81.

[29] Ferrari M, Patroni S, Balleri P. Measurement of enamel thickness in relation to reduction for etched laminate veneers. The International Journal of Periodontics and Restorative Dentistry 1992;23:407–13.

[30] Nattress BR, Youngson CC, Patterson JW, et al. An in vitro assessment of tooth preparation for porcelain veneer restorations. Journal of Dentistry 1995;23:165–70.

[31] Olgart L, Bra¨nnstrom M, Johnson G. Invasion of bacteria into dentinal tubules; experiments in vivo and in vitro. Acta Odontologica Scandinavica 1974;32:61–70.

[32] Bra¨nnstro¨m M. Etiology of dentin hypersensitivity. Proceedings of the Finnish Dental Society 1992;88(Suppl. 1):7–13.

[33] Ellege DA, Schorr BI. A provisional restoration technique for laminate veneer preparation. The Journal of Prosthetic Dentistry 1989;62:139–42.

[34] Rada RE, Jankowski BJ. Provisional laminate veneer provisionalization using visible light-curing acrylic resin. Quintessence International 1991;22:291–3.

[35] Nikaido T, Burrow MF, Tagami J, et al. Effect of pulpal pressure on adhesion of resin composite to dentin: bovine serum versus saline. Quintessence International 1995;26:221–6.

[36] Cagidiaco MC, Ferrari M, Garberoglio R, et al. Dentin contamination protection after mechanical preparation for veneering. American Journal of Dentistry 1996;9:57–60.

[37] Cobb DS, Reinhardt JW, Vargas MA. Effect of HEMA-containing dentin desensitizers on shear bond strength of a resin cement. American Journal of Dentistry 1997;10:62–5.

[38] Paul SJ, Scha¨rer P. The dual bonding technique: a modified method to improve adhesive luting procedures. International Journal of Periodontics & Restorative Dentistry 1997;17:537–45.

[39] Kelsey WP, Latta AM, Blankenau RJ. Effect of provisional restorations on dentin bond strength of resin cements. American Journal of Dentistry 1998;11:67–70.

[40] Highton R, Caputo AA, Matyas J. A photoelastic study of stresses on porcelain laminate preparations. The Journal of Prosthetic Dentistry 1987;58:157–61.

[41] Hui KKK, Williams B, Davis EH, et al. A comparative assessment on the strengths of porcelain veneers for incisor teeth dependent on their design characteristics. British Dental Journal 1991;171:51–5.

[42] Gilde H, Lenz P, Furst U. Untersuchungen zur belastbarkeit von Keramikfacetten. Deutsche Zahna¨rtzliche Zeitschrift 1989;44:869–71.

[43] Meijering AC, Creughers NHJ, Roeters FJM, et al. Survival of three types of veneer restorations in a clinical trial: a 2.5-year interim evaluation. Journal of Dentistry 1998;26:5638.

[44] Clyde JS, Gilmoure A. Porcelain veneers: a preliminary review. British Dental Journal 1988;164:9–14.

[45] Wildgoose DG, Winstanley RB, van Noort R. The laboratory construction and teaching of ceramic veneers: a survey. Journal of Dentistry 1997;25:119–23.

[46] Stangel I, Nathanson D, Hsu CS. Shear strength of the composite bond to etched porcelain. Journal of Dental Research 1987;66: 1460–5.

[47] Lacy AM, Laluz J, Watanabe LG, et al. Effect of porcelain surface treatment on the bond to composite. The Journal of Prosthetic Dentistry 1988;60:288–91.

[48] Nicholls JI. Tensile bond of resin cements to porcelain veneers. The Journal of Prosthetic Dentistry 1988;60:443–7.

[49] Lu R, Harcourt JK, Tyas MJ, et al. An investigation of the composite resin/porcelain interface. Australian Dental Journal 1992;37:12–19.

[50] Scha¨ffer H, Dumfahrt H, Gausch K. O¨ berfla¨chenstruktur und substanzverlust beim a¨tzen keramischer materialien. Schweizerische Monatsschrift Zahnmedicin 1989;90:530–43.

[51] Yen TW, Blackmann RB, Baez RJ. Effect of acid etching on the flexural strength of a feldspathic porcelain and a castable glass ceramic. The Journal of Prosthetic Dentistry 1993;70:224–33.

[52] Peumans M, Van Meerbeek B, Yoshida Y, et al. Porcelain veneers bonded to tooth structure: an ultra-morphological FE-SEM examination of the adhesive interface. Dental Materials 1999.

[53] Calamia JR, Vaidyanathan J, Vaidyanathan TK, et al. Shear bond strength of etched porcelains. Journal of Dental Research 1985;64:828 Abstract 1096.

[54] Roulet JF, So¨derholm KJM, Longmate J. Effects of treatment and storage conditions on ceramic/composite bond strength. Journal of Dental Research 1995;74:381–7.

[55] Hussain MA, Bradford EW, Charlton G. Effect of etching on the strength of aluminious porcelain jacket crowns. British Dental Journal 1979;147:89–90.

[56] Jones DW. The strength and strengthening mechanisms of dental ceramics. In: McLean JW, editor. Dental ceramics, Proceedings of the First International Symposium on Ceramics, Chicago: Quintessence Publishing Co, 1983. p. 83–136.

[57] Albers HF. Bonded tooth colored restoratives: indirect bonded restorations, Santa Rosa: Alto Books, 1989. p. 1–42 Supplement.

[58] Jones GE, Boksman L, McConnell RL. Effect of etching technique on the clinical performance of porcelain veneers. Quintessence of Dental Technology 1986;10:635–7.

[59] Aida M, Hayakawa T, Mizukawa K. Adhesion of composite to porcelain with various surface conditions. The Journal of Prosthetic Dentistry 1995;73:464–70.

[60] Suh BI. All Bond—Fourth generation dentin bonding system. Journal of Esthetic Dentistry 1991;3:139–46.

[61] Mu¨ller G. A¨ tzen und silaniseren dentaler keramiken. Deutsche Zahna¨rtzliche Zeitschrift 1988;43:438–41.

[62] Williamson RT, Mitchell RJ, Breeding LC. The effect of fatigue on the shear bond strength of resin bonded porcelain. Journal of Prosthodontics 1993;2:115–9.

[63] Swift B, Walls AWG, McCabe JF. Porcelain veneers: the effect of contaminants and cleaning regimens on the bond strength of porcelain to composite. British Dental Journal 1995;179:203–8.

[64] Holtan JR, Lua MJ, Belvedere P, et al. Evaluating the effect of glove coating on the shear bond strength of porcelain laminate veneers. Journal of the American Dental Association 1995;126:611–6.

[65] Sheth J, Jensen M, Tolliver D. Effect of surface treatment on etched porcelain bond strength to enamel. Dental Materials 1988;4:328–37.

[66] Tjan AHL, Dunn JR, Grant BE. Effect of fitting paste on bond strength of composite/porcelain. Journal of Dental Research 1989;68:270 Abstract 714.

[67] Della Bona A, Northeast SE. Shear bond strength of resin bonded ceramic after different try-in procedures. Journal of Dentistry 1994;22:103–7.

[68] Davis BK, Aquilino SA, Lund PS, et al. Subjective evaluation of the effect of porcelain opacity on the resultant color of porcelain veneers. International Journal of Prosthodontics 1990;3:567–72.

[69] Davis BK, Scott JO, Johnston WM. Effect of porcelain shades on final shade of porcelain veneers. Journal of Dental Research 1991;70:475 Abstract 1671.

[70] Davis BK, Aquilino SA, Lund PS, et al. Colorimetric evaluation of the effect of porcelain opacity on the resultant color of porcelain veneers. International Journal of Prosthodontics 1992;5:130–6.

[71] Mo¨rmann WH, Link C, Lutz F. Color changes in veneer ceramics caused by bonding composite resins. Acta Med Dent Helv 1996;1:97–102.

[72] Davis BK, Papcum LJ, Johnston WM. Effect of cement shade on final shade of porcelain veneers. Journal of Dental Research 1991;70:297 Abstract 250.

[73] Davis BK, Johnston WM, Saba RF. Kubelka-Munk reflectance theory applied to porcelain veneer systems using a colorimeter. International Journal of Prosthodontics 1994;7:227–33.

[74] Peumans M, Van Meerbeek B, Lambrechts P, et al. Five-year clinicalperformance of porcelain veneers. Quintessence International 1998;29:211–21.

[75] Christensen GJ, Christensen RP. Clinical observations of porcelainveneers: a three year report. Journal of Esthetic Dentistry 1991;3:174–9.

[76] Meijering AC, Roeters JM, Mulder J, et al. Patients' satisfaction with different types of veneer restorations. Journal of Dentistry 1997;25:493–7.2-Smile Attractiveness.

[77] Samorodnitzky-Naveh GR, Geiger SB, Levin L. Patients' satisfaction with dental esthetics.J Am Dent Assoc. 2007 Jun;138(6):805-8.

[78] Sousa Dias N, Tsingene F. Smile's Aesthetic Evaluation form: a useful tool to improve communications between clinicians and patients during multidisciplinary treatment. Eur J Esthet Dent. 2011 Summer; 6(2):160-76.

[79] Calamia JR. Etched porcelain facial veneers: a new treatment modality based on scientific and clinical evidence.N Y J Dent. 1983 Sep-Oct; 53(6):255-9.

[80] Friedman MJ. A 15-year review of porcelain veneer failure--a clinician's observations.Compend Contin Educ Dent. 1998 Jun;19(6):625-8, 630, 632.

[81] Magne P, Perroud R, Hodges JS, Belser UC. Clinical performance of novel-design porcelain veneers for the recovery of coronal volume and length. Int J Periodontics Restorative Dent. 2000; 20:440 57.

[82] Burden DJ, Pine CM. Self-perception of malocclusion among adolescents.Community Dent Health. 1995 Jun;12(2):89-92.

[83] Katz RV. Relationships between eight orthodontic indices and an oral self-image satisfaction scale.Am J Orthod. 1978 Mar;73(3):328-34. No abstract available.

10.0 APPENDICES

Appendix I: Ethical approval from HBMCDM Research Ethics Committee

Appendix II: Research information sheet and Study Consent sheets.

Appendix III: The original questionnaire form

Appendix I

MBRU
جامعة محمد بن راشد للطب والعلوم الصحية
MOHAMMED BIN RASHID UNIVERSITY OF MEDICINE AND HEALTH SCIENCES

Athanasios E. Athanasiou, D.D.S., M.S.D., Dr. Dent.
Dean
Professor & Program Director in Orthodontics
Hamdan Bin Mohammed College of Dental Medicine

Ref: HBMCDM/EC/2018
Date: November 26, 2015

Dr. Noura Mohamed Al-Hassani
Resident, Prosthodontics Department
Hamdan Bin Mohammed College of Dental Medicine
PO Box 505097
Dubai Healthcare City
Dubai

Title of project: A comparison of the perception of dental esthetics patterns of porcelain laminate veneers between the Prosthodontic Residents and UAE recognized Specialists in Prosthodontics
Reference: EC0615-001

Dear Dr. Noura,

Thank you for submission of your proposal for approval to the Ethics Committee.

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion, effective 22nd November, 2015, on the basis described in the application form.

The favourable opinion is given provided that all data used for the study and that are archived are anonymous.

Yours sincerely,

Professor Athanasios E. Athanasiou
Chairman, Ethics Committee

Appendix II

HAMDAN BIN MOHAMMED COLLEGE OF DENTAL MEDICINE

RESEARCH SUBJECT INFORMATION AND CONSENT FORM

You are being asked to volunteer for a medical research study. Before agreeing to participate in this study, it is important that you read this form. This form, called a consent form, describes the purpose, procedures, benefits, financial payment, risks and discomforts of the study. It also describes the alternative procedures that are available to you and your right to withdraw from the study at any time. No promises or guarantees can be made as to the results of the research study. Please ask as many questions as you need to so that you can decide whether you want to be in the study. This consent form may contain words that you do not understand. Please ask the study doctor or the study staff to explain any words or information that you do not clearly understand. You may take home an unsigned copy of this consent form to think about or discuss with family or friends before making your decision.

TITLE OF STUDY: The perception of dental esthetics assessed by Prosthodontic Residents and UAE recognized Specialists in Prosthodontics.

INVESTIGATOR(S): Noura Al Hassani

CONTACT DETAILS: 050 6572255--- dr.no.ura@hotmail.com

SUPERVISOR(S):

Dr.Moosa Abuzayda, Associate Professor in Prosthodontic

Prof. Alexander Milosevic, professor and program director-prosthodontics

Dr.Amar Hassan, Associate Professor in biostatistics.

PURPOSE OF RESEARCH: To compare prosthodontic residents and UAE recognized specialists in prosthodontics when assessing the dental esthetic pattern of porcelain laminate veneers.

PROCEDURES TO BE USED: Photographs will be taken under natural light for patients who had at least 2 veneers on the anterior teeth. Three photographs will be taken of the lower third of the face of patients in natural light against a white background in relaxed, smiling and stretched smile.

EXPECTED LENGTH OF PARTICIPATION: 20 to 30 minutes.

BENEFITS TO THE SUBJECT: as material for master theses.

RISKS TO THE SUBJECT: None

COSTS: None

ALTERNATIVE TO PARTICIPATION: No alternative to participation

CONFIDENTIALITY & ANONYMITY: Only the investigator and the supervisors will have access to the patient's personal details. This information will be protected and not published.

THIRD PARTY ACCESS TO DETAILS: No one beyond the investigator and supervisors will have access to any information relating to the subject.

CANCELLATION & REVERSIBILITY: The subject can withdraw from the study at any time.

MY RESPONSIBILITIES IN PARTICIPATION IN THE STUDY: Attendance to the clinic for one appointment for three photographs.

CONSENT

I have read the information in this consent form. My questions about the study and my participation in it have been answered. I freely consent to participate in this study. I authorize the use and disclosure of my health information to the parties according to that described above. By signing this consent form, I have not waived any of the legal rights which I otherwise would have as a subject in a research study.

SIGNATURE OF SUBJECT

DATE

NAME (Please print)

SIGNATURE OF INVESTIGATOR

DATE

NAME (Please print)

APPENDIX III

DATA COLLECTION SHEET

Gender:

Age:

Country of under-graduation education:

Country of post-graduation education:

Experience on practice (years) before post-graduation:

Experience on practice (years) after post-graduation:

Country of current practice:

Case 1:

1- How do you rate the appearance of the patient smile?

Poor Average Good Very good Excellent

2- How do you rate the shape and contour of the veneers?

Poor Average Good Very good Excellent

3- How do you rate the shade of the veneers?

Poor Average Good Very good Excellent

4- Do you find the length/width ratio of the veneers appropriate?

Poor Average Good Very good Excellent

5- How do you rate the relationship of incisal edges to the lower lip?

Poor Average Good Very good Excellent

6- How do you rate the relationship of the soft tissue around the veneer?

Poor Average Good Very good Excellent

7- How do you rate the tooth display and lip position during patient smile?

Poor Average Good Very good Excellent

Case 2:

1- How do you rate the appearance of the patient smile?

Poor Average Good Very good Excellent

2- How do you rate the shape and contour of the veneers?

Poor Average Good Very good Excellent

3- How do you rate the shade of the veneers?

Poor Average Good Very good Excellent

4- Do you find the length/width ratio of the veneers appropriate?

Poor Average Good Very good Excellent

5- How do you rate the relationship of incisal edges to the lower lip?

Poor Average Good Very good Excellent

6- How do you rate the relationship of the soft tissue around the veneer?

Poor Average Good Very good Excellent

7- How do you rate the tooth display and lip position during patient smile?

Poor Average Good Very good Excellent

Case 3:

1- How do you rate the appearance of the patient smile?

Poor Average Good Very good Excellent

2- How do you rate the shape and contour of the veneers?

Poor Average Good Very good Excellent

3- How do you rate the shade of the veneers?

Poor Average Good Very good Excellent

4- Do you find the length/width ratio of the veneers appropriate?

Poor Average Good Very good Excellent

5- How do you rate the relationship of incisal edges to the lower lip?

Poor Average Good Very good Excellent

6- How do you rate the relationship of the soft tissue around the veneer?

Poor Average Good Very good Excellent

7- How do you rate the tooth display and lip position during patient smile?

Poor Average Good Very good Excellent

Case 4:

1- How do you rate the appearance of the patient smile?

Poor Average Good Very good Excellent

2- How do you rate the shape and contour of the veneers?

Poor Average Good Very good Excellent

3- How do you rate the shade of the veneers?

Poor Average Good Very good Excellent

4- Do you find the length/width ratio of the veneers appropriate?

Poor Average Good Very good Excellent

5- How do you rate the relationship of incisal edges to the lower lip?

Poor Average Good Very good Excellent

6- How do you rate the relationship of the soft tissue around the veneer?

Poor Average Good Very good Excellent

7- How do you rate the tooth display and lip position during patient smile?

Poor Average Good Very good Excellent

Case 5:

1- How do you rate the appearance of the patient smile?

Poor Average Good Very good Excellent

2- How do you rate the shape and contour of the veneers?

Poor Average Good Very good Excellent

3- How do you rate the shade of the veneers?

Poor Average Good Very good Excellent

4- Do you find the length/width ratio of the veneers appropriate?

Poor Average Good Very good Excellent

5- How do you rate the relationship of incisal edges to the lower lip?

Poor Average Good Very good Excellent

6- How do you rate the relationship of the soft tissue around the veneer?

Poor Average Good Very good Excellent

7- How do you rate the tooth display and lip position during patient smile?

Poor Average Good Very good Excellent

Case 6:

1- How do you rate the appearance of the patient smile?

Poor Average Good Very good Excellent

2- How do you rate the shape and contour of the veneers?

Poor Average Good Very good Excellent

3- How do you rate the shade of the veneers?

Poor Average Good Very good Excellent

4- Do you find the length/width ratio of the veneers appropriate?

Poor Average Good Very good Excellent

5- How do you rate the relationship of incisal edges to the lower lip?

Poor Average Good Very good Excellent

6- How do you rate the relationship of the soft tissue around the veneer?

Poor Average Good Very good Excellent

7- How do you rate the tooth display and lip position during patient smile?

Poor Average Good Very good Excellent

Case 7:

1- How do you rate the appearance of the patient smile?

Poor Average Good Very good Excellent

2- How do you rate the shape and contour of the veneers?

Poor Average Good Very good Excellent

3- How do you rate the shade of the veneers?

Poor Average Good Very good Excellent

4- Do you find the length/width ratio of the veneers appropriate?

Poor Average Good Very good Excellent

5- How do you rate the relationship of incisal edges to the lower lip?

Poor Average Good Very good Excellent

6- How do you rate the relationship of the soft tissue around the veneer?

Poor Average Good Very good Excellent

7- How do you rate the tooth display and lip position during patient smile?

Poor Average Good Very good Excellent

Case 8:

1- How do you rate the appearance of the patient smile?

Poor Average Good Very good Excellent

2- How do you rate the shape and contour of the veneers?

Poor Average Good Very good Excellent

3- How do you rate the shade of the veneers?

Poor Average Good Very good Excellent

4- Do you find the length/width ratio of the veneers appropriate?

Poor Average Good Very good Excellent

5- How do you rate the relationship of incisal edges to the lower lip?

Poor Average Good Very good Excellent

6- How do you rate the relationship of the soft tissue around the veneer?

Poor Average Good Very good Excellent

7- How do you rate the tooth display and lip position during patient smile?

Poor Average Good Very good Excellent

Case 9:

1- How do you rate the appearance of the patient smile?

Poor Average Good Very good Excellent

2- How do you rate the shape and contour of the veneers?

Poor Average Good Very good Excellent

3- How do you rate the shade of the veneers?

Poor Average Good Very good Excellent

4- Do you find the length/width ratio of the veneers appropriate?

Poor Average Good Very good Excellent

5- How do you rate the relationship of incisal edges to the lower lip?

Poor Average Good Very good Excellent

6- How do you rate the relationship of the soft tissue around the veneer?

Poor Average Good Very good Excellent

7- How do you rate the tooth display and lip position during patient smile?

Poor Average Good Very good Excellent

Case 10:

1- How do you rate the appearance of the patient smile?

Poor Average Good Very good Excellent

2- How do you rate the shape and contour of the veneers?

Poor Average Good Very good Excellent

3- How do you rate the shade of the veneers?

Poor Average Good Very good Excellent

4- Do you find the length/width ratio of the veneers appropriate?

Poor Average Good Very good Excellent

5- How do you rate the relationship of incisal edges to the lower lip?

Poor Average Good Very good Excellent

6- How do you rate the relationship of the soft tissue around the veneer?

Poor Average Good Very good Excellent

7- How do you rate the tooth display and lip position during patient smile?

Poor Average Good Very good Excellent