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Research Article

Comparison of Maxillary Anterior Dentogingival Esthetics Perception between Dentists and Saudi Lay Population in Eastern Province of Saudi Arabia

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Abstract

Background: Perception of esthetic smile may vary not only among patients themselves, but also among dentists. Previous reports showed discrepancies between Saudi dentists and Saudi laypeople in term of smile attractiveness.

Objective: The objective of this study was to compare the perception of the maxillary anterior dental and gingival aesthetics between dentists and general population using different images with various smile features.

Methods: A cross-sectional self-administered online survey was conducted for three months for two groups; practicing dentists and lay adult participants living in Eastern Province of Saudi Arabia. The surveys were administered to dentists and lay participants. This survey included participants' socio-economic status, different images with various smile qualities, and questions to rate aesthetics perceptions. Quantitative data categorized, tabulated and analyzed using SPSS program version 18. P-values of less than 0.05 were considered significantly different.

Results: The final sample was 293; 171 of them were lay participants while 68 were dentists. Around 66% of the lay participants were males, and 46% were with an income of > 5000 SR. Dentists and lay participants varied significantly in rating aesthetics perceptions and their preferences with respect to the whitest shade (56.7% vs. 27.9%), longer clinical crown (33.3% vs. 64.7%), rough teeth texture (29.2% vs. 50%), and highly smooth texture (45.6% vs. 29.4%), respectively.

Conclusion: Dental esthetics perceptions of smile features differ significantly between clinician and lay persons, discussing the treatment plan with patients is an essential part to achieve better results without undermining the patients' perception of dental aesthetic preferences.

Keywords: *Gingiva; Esthetics; Dental Esthetic; Dentist; Populations*

Introduction

The patient's attitude and perception towards dental appearance proved to be very important and should be acknowledged in dental treatment decisions [1,2]. Previous studies have indicated associations between patient's dental appearance and quality of life, and general well-being as well [3-6].

Furthermore, one's self body image especially smile perception has positive influence on one's social and psychologic role in daily life. The more patients' confidence, the better quality of life that person has [4,7].

Nevertheless, the facial aesthetics standards and norms are influenced by diverse origins including; society's perception of an individual dentogingival aesthetics, thoughts and beliefs, cultural differences and values in specific ethnic groups [8-10]. Moreover, the perception of beauty may be affected by media that directly influence the patient's demands regarding esthetic dentistry [9].

Moreover, the maxillary anterior teeth are a crucial esthetic element of person smile [11]. Several factors were found to significantly influence maxillary anterior teeth esthetics such as; the position of maxillary central incisors incisal edge tooth shade, contours, texture, size, alignment and the amount of gingival display [12-14].

Some studies observed that during smiling, some gingival display appearing with maxillary incisors together is considered more attractive than no display [11,15]. Nevertheless, muscle tone decreases by age leading to a flaccid upper lip, so the incidence of gummy smiles is more relevant in younger age [16].

Interestingly, previous studies showed that up to 4 mm of gingival display was considered acceptable for laypeople's perspective, whereas from dentist perspective, the standard range was 0 - 2 mm [15-18].

Additionally, previous studies showed that dentist and laypersons have different perception regarding smile attractiveness [19,20]. However, patient is usually treated by dentists' perspective for attractive smile which usually depends on the basic scientific standards and measurable landmarks. Therefore, the growing esthetic expectations of nowadays patients should be carefully planned by dentists in order to meet patient's esthetic expectation without jeopardizing the dental treatment outcome.

Aim of the Study

The aim of the current study was to assess aesthetics perception of smile attractiveness the maxillary anterior teeth and gingiva between general dentists and Saudi laypeople.

Materials and Methods

Design

A cross-sectional self-administered online survey for three months was conducted in the Eastern Province of Saudi Arabia. This study was approved by the institutional review board (IRB 202014) in Imam Abdulrahman bin Faisal University before data collection began. The selected smile was a frontal view of 22-year-old Saudi female. Selection of this female participant was based on the presence of these criteria; 1) well aligned dentition; 2) convenient gingival display on posed smiling; 3) good gingival architecture; 4) had a reasonably attractive posed smile as determined by the research team and 5) no history of previous orthodontic, restorative or periodontal treatment in the anterior teeth rather than scaling. Before the survey began, the female participant whose images were used in the questionnaires knew and agreed to the modifications of her smile and signed an informed consent.

Study participants

A random sampling method was used for recruiting both the laypeople and professionals for 3 months. The study survey was given into two groups; dental practitioners (dentists, dental intern) and lay adult participants. All participants were recruited through the very commonly used social media App, "WhatsApp", distributed mainly in the Eastern Province of Saudi Arabia. For the professionals, eligibility criteria required individuals to have completed 6 years of dentistry school or received a bachelor's degree or higher in dentistry. In order to avoid the confounding effect of other dental work community and to have clearer association, we excluded the following: dental students, dental technicians, dental hygienists, dental assistants and students who did not finish 6 years of studying dentistry. Nevertheless, we defined laypeople as any person who is not specialized in dentistry. Only adults aged between 18 and 65 years were included in the study. Eligible sample who matched the selection criteria were identified by the research team after data collection. Two individuals were excluded from the study based on incomplete data.

Photographs

The taken photograph of the healthy female smile was presented in high resolution (2000-pixel), measuring 4 × 6". The photograph was presented in the original size. The photo was duplicated and digitally altered with image manipulation using Adobe® Photoshop® CS

software version 8.0. A total of 19 photographs were produced. The smile characteristics in the taken photograph was altered in order to create different dental and periodontal smile aesthetics. Each smile quality was intentionally altered with 1 to 2 progressive variations of the original photograph to common maxillary anterior dentogingival aesthetic characteristics. These alterations were chosen based on their frequency and clinical significance to the smile. To reduce the number of confounding variables that affect the participants' judgment, the other facial structures such as nose, and chin were eliminated from the image. The altered smile features were as follows: tooth shade, Length of clinical crowns, Incisal edge and angle shape, Distance of lateral incisors from occlusal plane, different gingival height of lateral incisors, Texture of the teeth, Shape of gingival contour.

Using altered photograph to change morphologic attributes is regarded as a simple and reliable method for evaluating the perception and preference of anterior dentogingival aesthetics for both Laypeople's and dental perspective [15].

For the purpose of preliminary validation, we pilot this questionnaire on nine subjects (3 researchers, 3 dentists, and 3 laypeople), and we modified the survey items accordingly. For shading classification, we designed our photos to resemble Vita Classic Shading Guide. Although we adapted Vita Classic Shading Guide in our designed photos, we were fulfilled to follow the three-simple description of shading very white (the whitest), moderately white, and yellowish.

Questionnaire items

The surveys were in two languages; English and Arabic, and they were administered to dentists and lay participants, respectively. The development of the surveys format, structure and content were adapted from similar previous studies [15,21]. These surveys included participants' socio-economic status, and questions about their perception of different images with various dentogingival features smile qualities (Figure 1-3). To see if the two cohorts gave the same perception, the same question was asked for both groups. The questionnaire was composed of 14 items; seven of them represented the seven esthetic separate smiling categories listed previously. Participants were asked to choose their one preferred smile. In addition, each question was provided with one more choice, "no difference", to be chosen when alteration did not affect their perception.

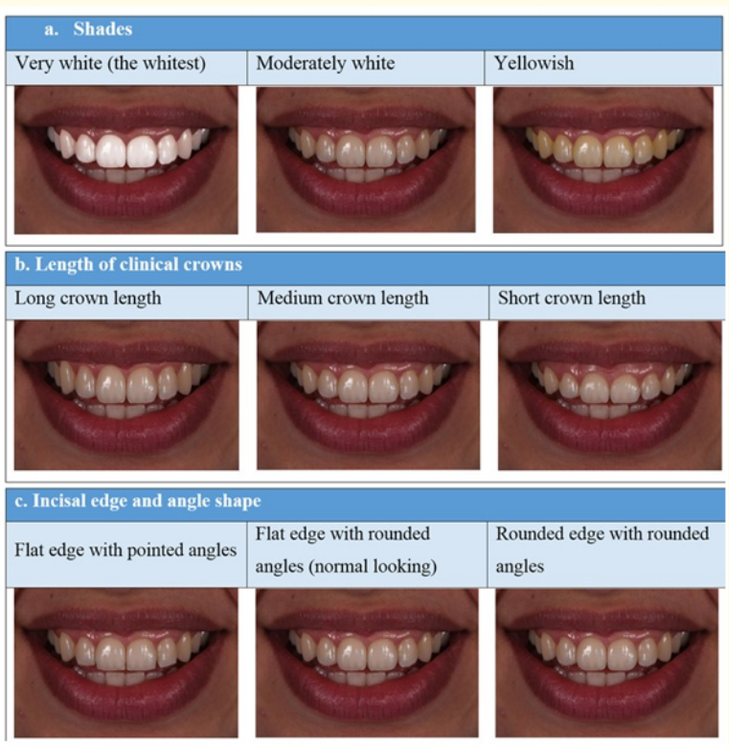

Figure 1: *a- First item had three pictures of a smile with different shades (very white, moderately white, and yellowish). b- Second item had three pictures of the same smile with different length of clinical crowns (long crown, medium length of crown, and short crown). c- Third item had three images of the same smile with different incisal edge and angle shape (flat edge with pointed angles, flat edge with rounded angles [normal], and rounded edge with rounded angle).*

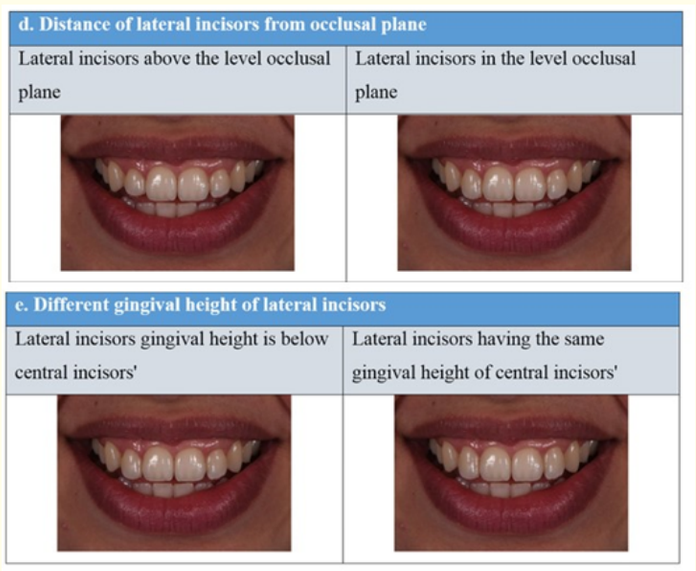

Figure 2: *d- Fourth item had two similar images with different distance of lateral incisors from occlusal plane (laterals are away from occlusal plane, and laterals are in the level of occlusal plane). e- Fifth item had two similar images with different gingival height of lateral incisors; (laterals gingival height is below centrals, laterals having the same gingival height of centrals).*

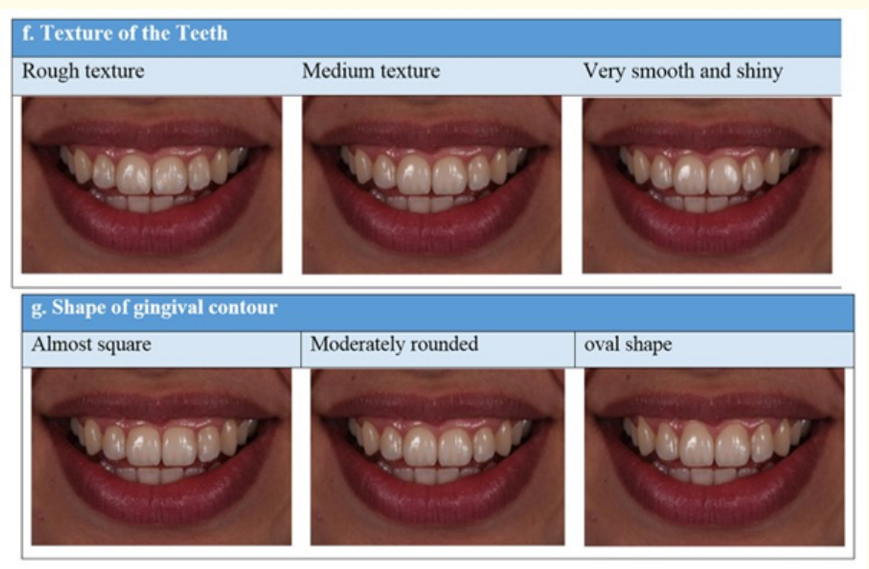

Figure 3: *f- Sixth item had three similar smiles with different texture of teeth, (rough texture, medium texture, very smooth and shiny). g- Last item has three pictures of the same smile with different shape of gingival contour, (almost square, moderately rounded, oval shape).*

For the purpose of measuring the preferred teeth shade, subjects were asked item 1 in the survey (Figure 1-3). Moreover, we used item 2 to assess the preferred extent of appearance of the gingiva during smiling. Item 3 was designed to assess the impact of different sharpness of the angles and edges of maxillary anterior teeth (centrals and laterals) on the perception of preferred smile. Additionally, in order to assess the effect of having different distances of the maxillary lateral incisor edge from the occlusal plane on the beauty of given smiles, the participants were asked item 4 in the questionnaire. Furthermore, the impact of gingival level of maxillary lateral incisors was also assessed in item 5 using different pictures with different gingival heights of the laterals. In order to understand and evaluate the impact of teeth texture on participants' perception using different levels of surface roughness, item 6 was added in our survey. We also considered the impact of gingival contour in item 7 through asking about the most attractive smile with illustrating pictures of different gingival shapes around the teeth (square, moderately round, oval).

Data statistical analysis

The quantitative data were categorized and analyzed using SPSS statistical software program (version 23 for Windows; SPSS, Chicago, Ill). Descriptive statistics including frequencies, means, and standard deviations were used. The proportion of the participants' characteristics were compared by using chi-square test. P-values of less than 0.05 were considered significantly different.

Results and Discussion

The final sample size was 171 laypeople and 68 dentists with mean age of 26.1 (±8.34) years; and mean age of 27.62 (±3.797), respectively. All participants were living in the Eastern Province, Saudi Arabia. Regarding gender distribution, around 66% (n = 113) of the general population and 69.1% of the dentists were males, while 33.9% (n = 58) and 30.9% (n = 21) respectively were females (Table 1).

	Dentists (n = 68)	**Laypeople (n = 171)**
	% (n)	% (n)
Age Mean (SD)	27.6 (3.80)	26.1 (8.34)
Gender		
Female	30.9 (21)	33.9 (58)
Nationality		
Saudi	94.1 (64)	100 (171)
Education Level		
Elementary	-	1.2 (2)
Intermediate	-	2.3 (4)
Secondary	-	22.8 (39)
University	-	67.3 (115)
Postgraduate	-	6.4 (11)
Employment status by working sector	-	
Employed		84.8 (145)
Governmental	-	62.0 (106)
Private	-	22.8 (39)
Unemployed	-	15.2 (26)
Monthly income in SR		
<1000	39.2 (67)	
1000-<5000	14.6 (25)	
5000-10000	21.6 (37)	
> 10000	24.6 (42)	
Dental College of Undergraduate Degree		-
Governmental Saudi College	70.6 (48)	-
Private Saudi College	13.2 (9)	-
Governmental Non-Saudi College	10.3 (7)	-
Private Non-Saudi College	5.9 (4)	-
Working Place		-
Governmental Sector	60.3 (41)	-
Private Sector	13.2 (9)	-
Academic Sector	26.5 (18)	-
Years in Practice		
< 1 year	39.7 (27)	-
2 - 5 years	47.1 (32)	-
6 - 10 years	8.8 (6)	-
11 - 15 years	2.9 (2)	-
> 15 years	1.5 (1)	-

Table 1: *Participants' socioeconomic characteristics.*

In term of the education level, most of laypeople (67.3%) were at university level and sixty two percent of the general populations were working in governmental sector. Nevertheless, when it come to the income level, most of the laypeople (53.8%) were in the categories of < 5000 SR.

With respect to shade selection, significant difference was found between the whitest shade selected by general population and dentist (56.7% vs. 27.9%, $x^2 = 16.1$, p = 0.0001). While the moderately white shade selection also showed significant difference between laypeople and dentists (38% vs. 72.1%, $x^2 = 22.6$, P < 0.00).

In addition, a significant difference was found between laypeople and dentists regarding the whitest and the moderately white shade selection ($x^2 = 4.8$, p = 0.02) (Figure 4A).

Moreover, a significant difference was found regarding the medium clinical crowns' length with 2 mm gingival display between laypeople and dentists (56.7% vs. 33.8%, $x^2 = 10.2$, p = 0.0014). Likewise, regarding long clinical crowns selection with no gingival display, a significant difference was found between laypersons and dentists (33.3% vs. 64.7%, $x^2 = 19.6$, p = < 0.001) (Figure 4B).

In term to the normal looking incisal edge and incisal angle, a significant difference was found between general population and dentists (41.5% vs. 63.2%, $x^2 = 9.15$, p = 0.0025). Similarly, regarding sharp angles selection, a significant difference was found between general population and dentists (26.9% vs. 13.2%, $x^2 = 5.13$, p = 0.0023). However, concerning rounded edges and angles selection, no significance was observed between general population and dentists (21.1% vs 22.1%, $x^2 = 0.02$, p = 0.86) (Figure 4C).

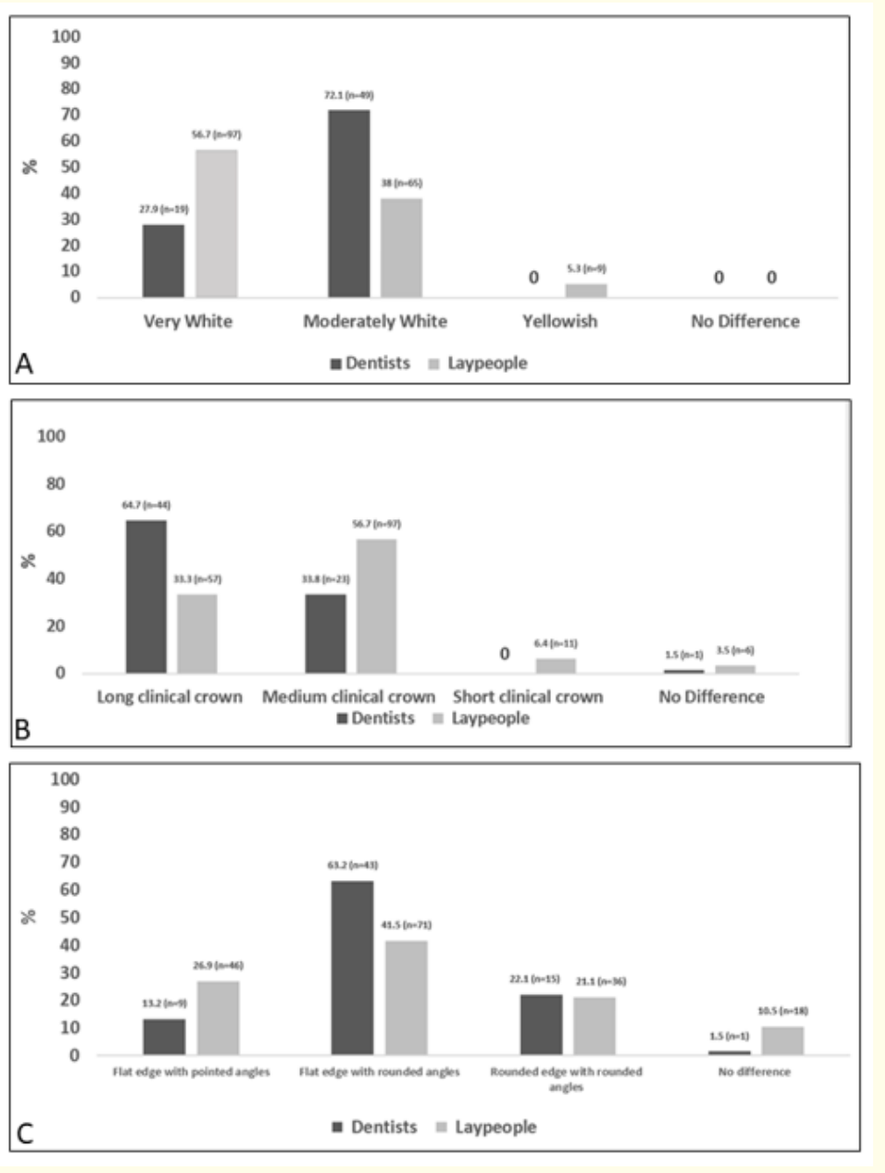

Figure 4: *A- Perception of shade level among dentists versus laypeople. B- Perception of length of clinical crowns among dentists versus laypeople. C- Perception of incisal edge and angle shape among dentists versus laypeople.*

Regarding the lateral incisors position above occlusal plane, significant difference was observed between general population and dentists (24.6% vs 60.3%, $x^2 = 27.2$, $p < 0.001$). In the same ways, a significant difference was observed between general population and dentists (39.2% vs 14.7%, $x^2 = 13.3$, $p = 0.0003$) regarding no difference selection. Nonetheless, no significance was observed between general population and dentists (36.3% vs 25.0%, $x^2 = 0.02$, $p = 0.86$) regarding lateral incisal level with occlusal plane (Figure 5A).

Regarding the gingival height of lateral incisors, most of general population selected no difference which was significantly different from dentists (42.1% vs 19.1%, $x^2 = 11.18$, $p = 0.0008$). Also, selecting the gingival height of lateral incisors being same level as central incisors showed significant difference between general population and dentist (35.7% vs 54.4%, $x^2 = 7.003$, $p = 0.0081$). But no significant difference was observed between general population and dentists (22.2% vs 26.5%, $x^2 = 0.499$, $p = 0.48$) regarding being below central incisors level (Figure 5B).

In term of the teeth texture, 45.6% of the general population preferred smooth texture, 29.2% rough texture, 16.4% preferred medium texture, and 8.8% shows no difference. Besides, fifty percent of the dentists preferred the rough teeth texture, 29.4% the smooth one, 13.2% the medium texture, and 7.4% showed no difference (Figure 5C).

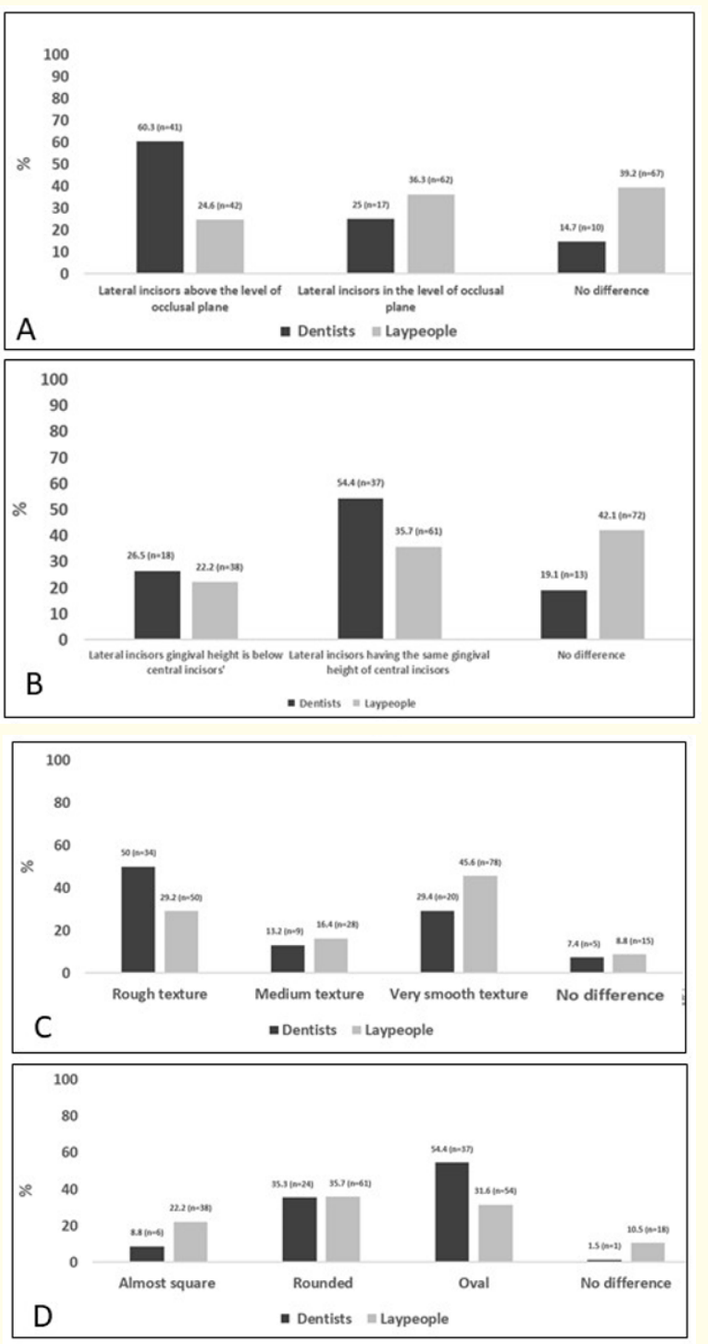

Figure 5: *A-Perception of distance of lateral incisors from occlusal plane among dentists versus laypeople. B- Perception of different gingival height of lateral incisors among dentists versus laypeople. C- Perception of texture of the teeth among dentists versus laypeople. D-Perception of shape of gingival contour among dentists versus laypeople.*

In respect of the gingival contour, 35.7% of the general population preferred rounded gingival contour, 31.6% oval shape, 22.2% preferred square shape gingival contour and 10.5% showed no difference. Additionally, around 55% of the dentists selected the oval gingival contour, 35.3% the round gingival contour, 8.8% selected the square gingival contour and 1.5% showed no difference (Figure 5D).

In this study we evaluated the perception of the anterior dental aesthetics between dentist and laypeople in Eastern province of Saudi Arabia. The interest of the general population was toward the whitest smile, while the dentists' interest toward the naturally white shade of teeth. Regarding the length of the clinical crown, almost half of the general populations preferred the medium clinical crown length, while more than half of the dentists preferred the long clinical crown with no gingival display (33.3% vs. 64.7%). The incisor teeth that have flat edge and rounded angles were the highest selected by both general population (41.5%) and dentists (63.2%).

The results of our study showed that minor discrepancies regarding lateral and central incisor edges have no influence on laypeople's perception. No difference was mostly selected regarding lateral incisors distance from occlusal plane (39.2%) or its gingival height (42.1%). In contrast to the dentists who focused on these minor characteristics of lateral incisors, 60.3% selected the lateral incisal edge to be above occlusal plane and 54.4% preferred gingival height to be on the same level of the central incisors. The presence of over-the-counter tooth whitening products as well as many professional dental bleaching products influenced are now available to meet is the most popular esthetic patients' demand which is tooth whitening [20].

Moreover, youths usually liked the white, healthy teeth rather than darker teeth color that is associated with natural increase in age and older unhealthy appearance [22]. Patients' satisfaction with shade match is important when constructing or replacing a restoration. Dunn., *et al.* [23] reported that tooth shade was crucial factor in assessing smile attractiveness among laypeople. Similarly, previous studies [1,23,24] showed that a difference exist between the level of satisfaction of patients and clinicians.

In contrast to our findings, Ruchika S., *et al.* [25] found that images with the lighter tooth shade were not the most attractive by dentists and laypeople. However, in their study the sample size was relatively small especially for laypeople; 70 participants for both dentist and layperson. Also, there was no information regarding the homogeneity of the participants descend, since European persons may have a different perception towards shade rather than Arab participants.

Previous studies [26,27] showed that dentists are more responsive towards deviations from ideal appearance than laypeople and darker tooth shades are not highly acceptable by laypeople than dentists. In agreement with our results, Wagner., *et al.* [28] and Carlsson., *et al.* [29] found that whiter teeth were more chosen by laypersons than dentists. Regarding the amount of gingival display during smiling, 56.7% of laypeople selected 2 mm gingival display, while 64.7% of dentist selected long crowns with no gingival display.

Our findings come in agreement with previous studies, they observed that 2 - 3 mm of gingival display during smiling was satisfactory for all participants [30,31]. In contrast to our findings regarding the general dentist selection, Almanea., *et al*. [32] observed that up to 2 mm of gingival show upon smiling was most attractive to dental specialist as well as laypersons. This could be explained by the youthful appearance that some gingival display provides caused by the belief that upper lip coverage is a sign of aging [33,34].

In our study, we eliminated most of the face, including the nose and chin, from the image to reduce the number of confounding variables. Previous study [26] showed that using full face images for evaluating smile attractiveness will be influenced with other racial factors rather than dental alone. Also, all images were modified using Computer software to maintain and standardize the image properties apart from the evaluated dental parameter.

It is assumed that professional instruction and training could enhance the esthetic judgment of individuals. For dentists, objective and quantifiable measurements are considered conventional indicators of esthetic success or failure. However, patients' satisfaction and demands must be considered while esthetic treatment planning.

Conclusion

Dental esthetics perceptions of smile features differ significantly between clinician and lay persons, discussing the treatment plan with patients is an essential part to achieve better results without undermining the patients' perception of dental aesthetic preferences.

Conflict of Interest

The authors declare no conflict of interest, financial or otherwise.

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