Original Article

Perception of Professional Female College Students Towards Smile arc Types and Outlook about their Appearance

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ABSTRACT

Aims and Objectives: The aim of this study is to assess the perception of female students about the type of smile arc as well as their outlook about different parameters of esthetics.

Materials and Methods: A study was conducted among female students of King Khalid University, Abha, Saudi Arabia. One section of the questionnaire contained pictures having three types of smile arc wherein the respondents had to select any response ranging from 1 to 4 (1 for beautiful, 2 for good, 3 for average, and 4 for poor); besides it included 12 questions regarding the viewpoints of respondents about their smile and dental esthetics. The collected data were analyzed using the statistical package for social services version 16.0 (SPSS Inc., Chicago, IL, USA, 2001).

Results: The dental students accounted for least mean score of 1.807 ± 0.8174 for consonant smile arc while it was 2.692 ± 0.8053 and 2.235 ± 0.9074 for information technology (IT) and medical students, respectively. When the individuals were asked whether they had a pleasant smile or not; only 53.8% of the dental students, 76.9% of the IT students, and 66.7% of the medical students responded positively.

Conclusion: It was concluded that most of the female dental students were able to identify the consonant smile arc as being more beautiful than the flat and reverse smile arcs whereas lesser medical and IT students could perceive the smile arcs in the same manner. It was also observed that almost all the study participants were quite conscious about their smile attractiveness and dental esthetics.

KEYWORDS: *Dental students, esthetics, orthodontists, perception, smile arc, teeth alignment*

INTRODUCTION

The latter overtaking the former, the competitive race between time and concept, of seeking dental treatment only for relieving pain and restoring function and to gaining esthetic value and beauty, is incredibly rapid in today's world of multidimensional advancement in health care, heralding a paradigm change toward significant overall improvement. Patients, nowadays, overwhelmingly demand beautification of their oral structure in its totality; and thus, much sensitivity and conscientious aspects are added thereto. Very generally and invariably people enhance their facial attractive features by way of resorting to smiling to their best.

Esthetics is viewed quite differently by present-day researchers in dentistry: according to them the type of smile arc, the presence/absence of buccal corridors, the smile symmetry, and the golden ratio play vital role in designing/classifying of beauty.[1,2] For a person to be an effective and reckonable part of society to his full satisfaction, the requirement of his social relations, as well as confidence, are taken to be directly and inalienably linked with his pattern and

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capacity of exhibiting a beautiful smile in its optimum countenance.[3] Thus, in addition to the correction of occlusion, an orthodontist is bound with the obligation as to satisfy his patient regarding his/her esthetic looks, of which the predominant component is a catching smile.[2] Of other various components of a balanced smile, smile arc is the important one needed to be considered thoughtfully and seriously while undertaking orthodontic treatment.[4]

The smile arc is defined as the relationship of the contour of the incisal edges of the maxillary anterior teeth relative to the curvature of lower lip during a social smile.[5] Different types of smile arcs have been acknowledged; when the curvature of incisal edges of maxillary anterior teeth is parallel to the upper border of lower lip, it forms the consonant smile arc.[6] When the incisal edges of maxillary anterior teeth are curved in reverse to the upper border of the lower lip, a nonconsonant or reverse smile arc is formed while the straight smile arc is the one in which the incisal edges of the upper anterior teeth are in straight line to the upper border of lower lip.[5] It is important enough to plan the orthodontic treatment appropriately wherein missing or trivializing consideration of the type of smile arc is unaffordable and undesirable.[7] At present, cosmetic dentistry has become much important, courtesy media, which shapes peoples' mindset toward changing their looks such that they should bear a resemblance to their desired models in actors/actresses or any personality of their choice. Hence, the orthodontists need to keep in view the choice and opinions of patients before planning a successful orthodontic treatment so that it is to up to the level of patient's satisfaction, insofar his desire is to be met with.

As in case of various other human conceptualizations, it is well-established fact that the perception of esthetics differs from one person to another. Hence, to ensure creating attractive smiles, dentists and orthodontists need to understand all the underlying factors and also the varying views of people under their treatment.

Consequent thereupon, a study was conducted among the female college students of Abha, Saudi Arabia, to understand and assess their perception about their own smile, its related characteristics as well as their knowledge regarding three types of smile arc.

MATERIALS AND METHODS

A cross-sectional study was conducted among the dental, medical, and information technology (IT) female students of King Khalid University, Abha, Saudi Arabia for 3 months from April to June 2017. Before the conduct of study ethical approval was taken from Scientific Research Committee King Khalid University College of Dentistry, Abha (SRC/REG/2017–2018/1). All the female undergraduate students, between the age range of 20–25 years old, were taken into the study who gave informed consent of participation. All those who had undergone orthodontic or prosthodontic treatment were excluded from the study. Moreover, the individuals with missing teeth, dental attrition, or having a history of lip surgery, were excluded from the study.

A total of 155 individuals were included in the study. A questionnaire [Appendix 1] (available online), having three sections, was formulated and pretested for its reliability and validity. Its reliability was assessed using kappa statistics which was found to be satisfactory.

The first section of questionnaire included questions related to demographic data such as age and specialty; in the second section of the questionnaire, pictures having three types of smile arcs (consonant, reverse, and straight), taken with permission from the previous research,[7] were used which were blinded and coded for its type, and the respondents had to select any response ranging from 1 to 4 (1 for beautiful, 2 for good, 3 for average, and 4 for poor); the respondents had to give one option for each picture. The third section of the questionnaire included 11 questions regarding the viewpoint of respondents about their own smile, the length of incisors, color of teeth, satisfaction with the looks of their gums, the need for their teeth to get straightened, and also their attitude and willingness toward the wearing of braces if required. Furthermore, one open-ended question was included in the questionnaire, at the end, asking about their wish to change anything about their smile. The questionnaires were hand-delivered to the individuals in the envelope and collected the same day from the respondents. The confidentiality of responses was assured to them so as to avoid the nonresponse bias. The responses of duly filled questionnaires were compiled and entered into Microsoft Excel sheet.

SAMPLE SIZE ESTIMATION

Formula:

$$n = \frac{2S^2\left(Z_{1-a/2} + Z_{1-\beta}\right)^2}{d^2}$$

$$S^2 = \frac{S_1^2 + S_2^2}{2}$$

Where,

- S_1^2: Standard deviation (SD) of the first group
- S_2^2: SD of the second group
- d^2: Mean difference between the samples

- α: Significance level
- 1− β: Power

(With the help of a pilot study, the mean difference between two groups was found to be 0.48 and SD was 0.805 and 0.907, for two groups, respectively. So for power 80%, level of significance α = 5% and 95% confidence interval, the effect size is 0.537; hence, the sample size of 50 was estimated for each group; making a final sample size of 150. To avoid nonresponse bias, we have taken a final sample of 155 subjects).

STATISTICAL ANALYSIS

The data were submitted to statistical analysis using software SPSS 16.0 (Statistical Package for Social Sciences; SPSS Inc., Chicago, IL, USA, 2001). Descriptive data for categorical variables were obtained through frequencies, while the descriptive data for continuous variables were obtained through mean and SD. The study involved the use of one-way ANOVA to analyze the perception of dental, IT and medical students toward the ideal smile. The significance of responses of survey (questionnaire) for perception of smile by three groups was tested by Pearson's Chi-square test. The level of significance was set to 0.05 and confidence interval of 95%.

RESULTS

In the present study, the mean age of study participants was 21.92 ± 1.45. The dental students accounted for least mean score of 1.807 ± 0.8174 for consonant smile arc while it was 2.692 ± 0.8053 and 2.235 ± 0.9074 for IT and medical students, respectively. For flat and inverted smile arcs, the dental students accounted for highest mean scores of 2.865 ± 1.0484 and 3.0769 ± 0.85969, respectively [Table 1].
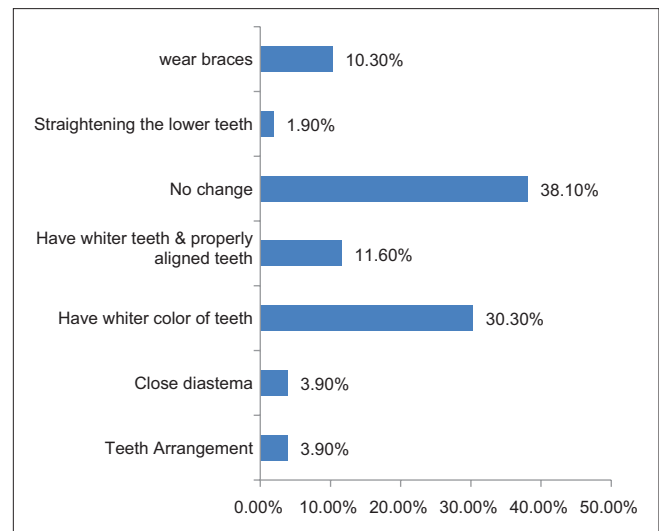
When the individuals were asked whether they had a pleasant smile or not; only 53.8% of the dental students, 76.9% of the IT students, and 66.7% of the medical students responded positively; a statistical significant ($P = 0.046$) difference was found between the three groups. The present study results showed that 57.7% of the dental students were not satisfied with their dental appearance while less percentage of the IT and medical students were unsatisfied with their dental esthetics [Table 2]. Only 30.8% of the dental students were satisfied with their tooth color while 69.2% of the dental students were not satisfied with the color of their teeth [Table 3].

About 38.10% of the participants did not want any change to improve their smile while as 30.30% of the participants wished to have whiter teeth and 10.03% want to wear braces [Graph 1].

Table 1: Comparison of smile perception of three groups for pictures of three types of smile arc

Picture design	n	Mean±SD	95% CI for mean		$P^\$$
			Lower bound	Upper bound	
Consonant					
IT	52	2.692±0.8053	2.4681	2.9165	0.000#
Medical	51	2.235±0.9074	1.9801	2.4905	
Dental	52	1.807±0.8174	1.5801	2.0353	
Flat					
IT	52	2.153±1.0550	1.8601	2.4476	0.002**
Medical	51	2.352±1.0163	2.0671	2.6388	
Dental	52	2.865±1.0484	2.5735	3.1573	
Inverted					
IT	52	2.115±0.8552	1.8773	2.3535	0.000#
Medical	51	2.333±0.8641	2.0903	2.5764	
Dental	52	3.0769±0.85969	2.8376	3.3163	

$^\$$By one-way ANOVA, **Significant $P<0.05$, #Highly significant $P<0.001$. SD=Standard deviation, CI=Confidence interval

Graph 1: Frequency distribution of respondents according to the responses for willing to undergo any changes for improving their smile

DISCUSSION

Smiling is one of the most esthetically cherished features for everyone particularly the youth especially females. Dental specialists need to well analyze this feature as an inalienable ingredient of overall facial analysis which leads them to arrive at the most workable treatment planning to the optimum degree of acceptance and satisfaction of patients.[8]

A person's activeness and personality have been found, as documented earlier, to be an offshoot of his behavior and attitude toward adapting himself to a smile, with its relevance, timing and quantum in a given situation wherein he makes a marked impact thereby.[9] The emotion of happiness is expressed vividly by a smile. It has gained much significance nowadays in esthetic

Table 2: Frequency distribution of responses to the questions (Q1-Q6) by three groups

Groups	Yes (%)	No (%)	χ^2 (df)	P
Q1. Do you have a pleasant smile?				
IT	76.9	23.1	6.178 (2)	0.046**
Medical	66.7	33.3		
Dental	53.8	46.2		
Q2. Do you ever put your hand over your mouth when you smile?				
IT	26.9	73.1	0.088 (2)	0.957*
Medical	27.5	72.5		
Dental	25.0	75.0		
Q3. Do you like the way your teeth look?				
IT	67.3	32.7	10.321 (2)	0.006**
Medical	70.6	29.4		
Dental	42.3	57.7		
Q4. Are your front teeth too long or too short?				
IT	19.2	80.8	0.056 (2)	0.972*
Medical	17.6	82.4		
Dental	19.2	80.8		
Q5. Are your front teeth too wide or too narrow?				
IT	23.1	76.9	1.340 (2)	0.512*
Medical	33.3	66.7		
Dental	28.8	71.2		
Q6. Are you satisfied with the way your gums of front teeth look?				
IT	75.0	25.0	0.960 (2)	0.619*
Medical	74.5	25.5		
Dental	67.3	32.7		

*Non-significant $P>0.05$, **Significant $P<0.05$

Table 3: Frequency distribution of responses to the questions (Q7-Q11) by three groups

Groups	Yes (%)	No (%)	χ^2 (df)	P
Q7. Do you have spaces in between your front teeth that you do not like?				
IT	42.3	57.7	13.07 (2)	0.001**
Medical	47.1	52.9		
Dental	75.0	25.0		
Q8. Do you like the color of your teeth?				
IT	26.9	73.1	0.289 (2)	0.865*
Medical	31.4	68.6		
Dental	30.8	69.2		
Q9. Do you wish your teeth were whiter?				
IT	96.2	3.8	4.601* (2)	0.100*
Medical	84.3	15.7		
Dental	84.6	15.4		
Q10. Do your teeth need a straightening?				
IT	40.4	59.6	0.265 (2)	0.876*
Medical	45.1	54.9		
Dental	44.2	55.8		
Q11. Would you like to wear braces?				
IT	53.8	46.2	0.400 (2)	0.819*
Medical	52.9	47.1		
Dental	48.1	51.9		

*Non-significant $P>0.05$, **Significant $P<0.05$

dentistry.[10] The most significant and deciding factors for facial attractiveness are shape, size, position and color of teeth, gingival display, type of smile, facial measurements, and morphology of lips.[11]

In the present study, dental students accounted for least mean score of 1.807 ± 0.8174 for perception about consonant smile arc while it was 2.692 ± 0.8053 and 2.235 ± 0.9074 for IT and medical students, respectively. For flat and inverted smile arcs, the dental students accounted for highest mean scores of 2.865 ± 1.0484 and 3.0769 ± 0.85969, respectively. These results are indicative of the fact that dental students are more or less aware about the ideal (consonant) type of smile arc than the students of other fields which might be due to their familiarity with smile, dental, and other esthetic parameters. It has been observed by various researchers in previous studies that a consonant smile arc is one of the significant factors for beautiful looks.[12,13] While

treatment of patients, the orthodontists have to take the smile arcs into consideration. Reverse smile arcs has been considered less esthetic than straight smile arcs. It is difficult to achieve the ideal smile arc on every patient as it depends on the inclination of occlusal plane and second order crown angulations of maxillary anterior teeth; so in such cases, the flat or reverse arc of patients is to be preserved and orthodontists should try to gain curvature resembling the lower lip.[1] In the present study, when the respondents were asked about their smile being pleasant or not; majority of students perceived their smiles to be pleasant when compared to those who did not perceive it to be so. When the responses were compared within groups, it was found that less percentage of dental students (53.8%) perceived their smiles to be pleasant compared to those of IT (76.9%) and medical (66.7%) fields. These findings indicate a more critical outlook of dental students regarding their smile perception. The results were in accordance with the previous study wherein the dental students were more critical in appraisal of their smile as their academic year of course increased and that's what might be due to the increase in their knowledge as they progressed toward completion of their course.[14]

Mal-alignment of teeth adversely affects individual's quality of life as has been mentioned in previous research.[15] The general success of patients in their lives is more or less dependent upon their good looking and attractive smiles. For an esthetic smile, a satisfying dental appearance plays a vital role.[16]

The present study results showed that 57.7% of the dental students were not satisfied with their dental appearance while less percentage of the IT and medical students were unsatisfied with their dental esthetics. This result was similar to the finding of previous study wherein majority of the dental students were not satisfied with their dental attractiveness and thus had a positive attitude toward their orthodontic correction of teeth.[17]

In the present study, 30.8%, 31.4%, and 26.9% of the dental, medical, and IT students, respectively, liked the color of their teeth while 69.2%, 68.6%, and 73.1% of the dental, medical, and IT students, respectively, did not like the color of their teeth. It has been mentioned in previous studies that tooth color is very important factor for self-satisfaction of people so far as their esthetics is concerned.[18,19] Majority of the participants (in all three groups) want their teeth to get whiter, in the present study. This finding was similar to the previous study wherein dental students wished to have whiter teeth.[20] In a yet another study, 34% of study population in the USA, were unsatisfied with their tooth color.[21] By and large, people especially the youth are more concerned about the dental esthetics since it is easy to recognize esthetic variations of the face which can consequently have a negative effect on one's quality of life.[22]

In current on hand study, 51.9% of the respondents (dental students) wished to wear braces for correction of their tooth/teeth alignment. This might be due to the fact that dental students are influenced by their knowledge gained during their formative years of dentistry course and hence their perception and consciousness about esthetics takes a different pattern.[23] In the present study, majority (75%) of dental students agreed that they have spaces between their teeth which they do not like while only 25% disagreed about having any such spaces in between their teeth. Spacing (absence of contact points between teeth) may be localized or generalized involving many teeth. Spacing was perceived in earlier study as having an impact on the social acceptance and also it has been related to less intellect among the individuals.[24]

In the study under reference now, when the respondents were asked if they wished to change anything about their smile; majority (30.30%) of the respondents desired to have whiter teeth; while 11.60% liked to align their teeth as well as to whiten their teeth; 10.30% wished to wear

braces, if required. These results suggest that most of the young students are eager to improve their looks in one or the other form. They want to look better so as to gain self-confidence in their personal and social life. The students especially in their adolescent stage are more conscious about them, and at the same time are uncertain about their recognition by their friends, relatives and elders. Hence, this might be the reason for them to evaluate their smile critically and to opt for changes so as to improve their esthetics.[25]

Currently, people going for orthodontic treatment highly prioritize their esthetic improvement; perception whereof may vary from the point of view of orthodontists in the sense that esthetic and clinical approaches may be divergent at times, what may be esthetically desired by patients may not be clinically right always in terms of function. It consequently raises a controversy as to which one of the two aspects (the esthetics or the function) should take precedence over the other. Thus, orthodontists have to take the appropriate decision such that both the aspects are accommodated rationally with due inclusion of patient's perception and aspiration. For achieving this goal, the dental specialist may need to counsel and educate the patients in the right direction with his technical expertise. Both the aspects (esthetics and function) should go hand-in-hand so that a balance is maintained and a satisfactory treatment outcome is achieved. Thus, specialist's apt tackling is very significant and decisive for achieving successful within due limits of patient's desires.

It has been documented in previous study that the expected results of orthodontic treatment by patients may not be the same as expected and planned by an orthodontist; so patient's perception holds significance at the very beginning of need assessment of treatment by orthodontists.[26]

SUMMARY OF PRIMARY AND SECONDARY OUTCOME

The dental students accounted for least mean score of 1.807 ± 0.8174 for consonant smile arc while it was 2.692 ± 0.8053 and 2.235 ± 0.9074 for IT and medical students, respectively, indicating that dental students were more aware about ideal type of smile arc when compared to other two groups of students.

When the participants were asked whether they had a pleasant smile or not; only 53.8% of the dental students, 76.9% of the IT students, and 66.7% of the medical students responded positively; a statistical significant ($P = 0.046$) difference was found between the three groups. These findings indicate a more critical outlook of dental students regarding their smile perception. About 38.10% of the participants did not want any change to improve their smile while as 30.30%

of the participants wished to have whiter teeth and 10.03% want to wear braces.

Strengths and limitations

Previously no such study has been conducted in Southern Saudi Arabia; hence, our study may provide useful information to dentists especially orthodontists regarding perception of students belonging to different professional fields. The self-consciousness of people about their esthetics adds value to cosmetic dentistry.

Finally, it is important to highlight the limitations of this study. We preferred to include only the female participants as they are more sensitive to esthetics and attractiveness. Although taking both boys and girls would have made it possible to assess the effect of gender on perception.

Areas of future research

1. The future studies should consider undertaking the oral examination of study participants so as to correlate subjective perception with objective findings
2. Visual analog Scale can be used in future research while assessing the perception about smile arcs
3. Effect of gender on esthetic perception may be assessed in future studies
4. The similar studies should be carried out in future involving larger sample size and more variables associated with smile arc such as lip morphology, buccal corridors, facial types, and measurements.

Conclusion

It was concluded that most of the female dental students were able to identify the consonant smile arc as being more beautiful than the flat and reverse smile arcs compared to the smaller number of medical and IT students who perceived the smile arcs in the same manner. Moreover, it was observed that almost all the study participants were quite conscious about their smile attractiveness and dental esthetics; and for improvement thereof they were ready to wear braces and go for tooth whitening.

Acknowledgment

Conflicts of interest

There are no conflicts of interest.

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APPENDIX 1: QUESTIONNAIRE

Part 1: S. No.: Age:....................................Specialty:....................................

Part 2: Rate the following three pictures of smile; choose one option for each picture:

1. Beautiful
2. Good
3. Average
4. Poor.

Consonant   .... Flat.................................... Inverted....................................

3rd Part: Answer the following questions:

Questions:
1. Do you have a pleasant smile?   ....   Y N
2. Do you ever put your hand over your mouth when you smile? ....   Y N
3. Do you like the way your teeth look? ....   Y N
4. Are your front teeth too long or too short?   ....   Y N
5. Are your frontteeth too wide or too narrow?   ....   Y N
6. Are you satisfied with the way your gums of front teeth look? ....   Y N
7. Do you have spaces in between your front teeth that you don't like?   ....   Y N
8. Do you like the color of your teeth?   ....   Y N
9. Do you wish your teeth were whiter? ....   Y N
10. Do your teeth need a straightening?   ....   Y N
11. If it were possible would you like to wear braces?   ....   Y N
12. If you could change anything about your smile, what would it be?   ....