Original Research Paper

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Perception of Smile aesthetic by dental students

Abstract:

Introduction: The endless quest for harmony of the smile has indeed let to great advances in dentistry. The features that determine smile aesthetics could provide significant insights into post-treatment satisfaction and may predict a patient's objectives when undergoing treatment.

Methods: Study is performed among 500 dental students. The study data were collected using a three-part questionnaire. The questionnaire included sociodemographic, facial aesthetic features, responses to photographs of different smiles. The smile aesthetics were evaluated according to their dentolabial, dentogingival, dental and dental arch characteristics using a 5-point numeric rating scale (1, best; 5, worst). The data were analysed using the Pearson's chi-square and Mann-Whitney U tests.

Result: The study was conducted among 500 student which included Dental hygienist, undergraduate and post graduate dental students. Significantly more post graduate and under graduate student than dental hygienist focused on a person's teeth when communicating ($p < 0.005$). Post graduate and under graduate student were more critical than Dental hygienists when evaluating diastema, dental crowding, gingival smile, protrusion of anterior teeth, dental spacing, hypodontia and maxillary arch midline discrepancy. The most unfavourable smile characteristics were identified in the dental analysis category, with dental spacing ranked as the worst smile feature (mean numeric rating scale score 3.53).

Conclusion: Among dental students, the most distracting characteristics of a smile when determining its attractiveness were dental spacing, diastema, dental crowding, protrusion of anterior teeth hypodontia and gingival smile.

Key-words: Smile aesthetic, diastema, malocclusion, facial features, students perception

Introduction:

Smile esthetic is an important aspect of dentistry that is gaining more and more attention in recent times. It involves the creation of a beautiful, natural-looking smile that enhances the overall appearance and confidence of a person. Dental students are trained to analyze and evaluate smile esthetics from various perspectives, such as facial symmetry, contour of the gums, number of gaps and spaces, tooth color, shape, and alignment. As dental students, we are taught to take into consideration not only the functional aspects of dentistry but also the aesthetic aspects. We understand the importance of creating a smile that not only functions well but also looks good.

According to the World Health Organization, oral health is intertwined with general health, which in turn determines quality of life, and appropriate oral health care reduces mortality. Promoting and enhancing the overall health of patients by management of oral health and dental esthetics is the primary goal of dentistry.[1]

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Smile aesthetics are defined by the teeth, which are framed by the lips, the contour of the gums, and the number of gaps and spaces. More precisely, the harmony and symmetry of an aesthetic smile is determined by the extent of exposure of the gingiva when smiling, the arc of the smile, the proportions of the teeth, the presence of a midline shift and changes in axial inclination, buccal corridors, gingival height and contours, presence of a diastema, and the colour of the teeth. Furthermore, patients are becoming more critical of their smiles and are seeking orthodontic treatment with more specific expectations.[1] One of the main drivers of this high demand for aesthetic treatment is the influence of social media, especially among young adults.

A pleasing smile is the result of an interaction of a number of components with varying degrees of importance, and an understanding of the principles that determine the balance between the knowledge of dental professionals regarding smile aesthetics and patients' perceptions is essential. The smile often defines a person's facial attractiveness, and so has a key role in social interaction. The correct order of priority of smile components when planning orthodontic treatment is a matter of debate.[2-3] The aims of this study was to identify the determinants of smile aesthetics as perceived by dental students and to examine factors that can alter the perception of smile characteristics. This paper explores the perception and understanding of dental students regarding smile esthetics, ideal smile and the factors that affect smile esthetics.

Methods:

The study was performed among 500 dental students at SPPGIDMS, Lucknow between March 2023 and March 2024.In total, 500 questionnaires were distributed and 450 were returned; the remaining questionnaires were either not returned or were returned with one or more unanswered items. No respondent selection bias was identified and the sample was representative of the reference population.

The first part of the questionnaire included sociodemographic items i.e., name, gender, and years of study; the second part included questions about facial aesthetic features; and the third part elicited responses to photographs of different smiles.

The image chosen for the questionnaire was a frontal view showing the anterior teeth, the surrounding gingival tissues, and the lips. The photographic inclusion criteria were that the images provided a frontal view, images were of good quality and represented only one dentolabial, dentogingival, dental, or dental arch smile characteristic (table 1).

The dental students were asked to evaluate each photograph aesthetically using a 5-point numeric rating scale (NRS; 1, best and 5, worst). The data were analyzed using Pearson's chi-square and Mann-Whitney U tests .

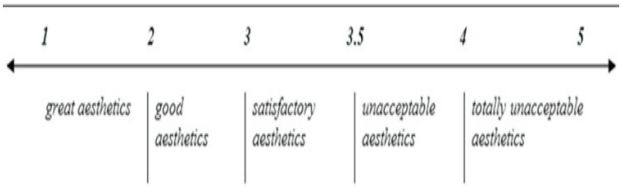


Fig 1: Numerical rating scale used to score smiles for their aesthetic value

Table 1 Aesthetic variables examined

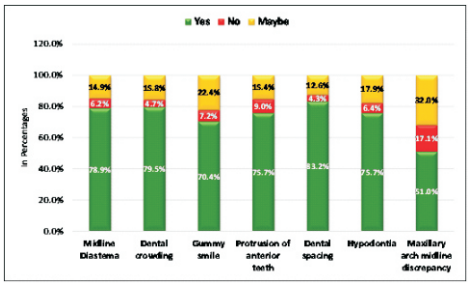
Features	Description
Diastema	Open spaces between the upper incisors.
Dental crowding	The dental arch length is less than the mesial distal width of the teeth intended to occupy it. Dental crowding occurs when the space required for the correct alignment of the teeth exceeds the space available in the dental arch. Crowding is classified to mild (2 – 3 mm), moderate (4 – 6 mm), severe (7 – 10 mm) and extreme (>10 mm).
Gingival smile	The amount of gingival shows above the central incisor crowns when smiling. More than 3mm is generally considered unattractive
Protrusionofanterior teeth	Increased incisal profile in the anteroposterior direction. 2-3 mm is the normal horizontal overlap of the incisors.
Dental spacing	Where there are gaps between the teeth
Hypodontia	A usually congenital condition of having fewer than the normal number of teeth. It is the developmental absence of 1 or more teeth.
Maxillary arch midline discrepancy	The relationship of the maxillary dental midline (measured between the central incisors) to the midline of the face. defined by the center of the philtrum. By definition, the ideal was considered to be 0 for this variable.

Statistical Analysis:

The statistical analysis was performed using (SPSS software) Descriptive statistics were used, i.e., the mean and standard deviation (SD) for frequency and the percentage for variables. The Mann-Whitney U test was used to compare differences in sociodemographic variables (e.g., gender and years of study). Pearson's chi-squared test was used to test the statistical significance of differences in responses according to sociodemographics (gender, years of study) and the answers to items in the secondpart of the questionnaire. A p-value of 0.05 was considered to be statistically significant

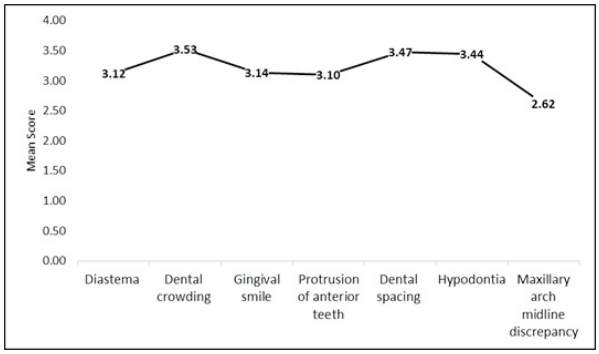
Results:

Knowledge about Characteristics of Aesthetic of smile Table 1 Aesthetic variables examined



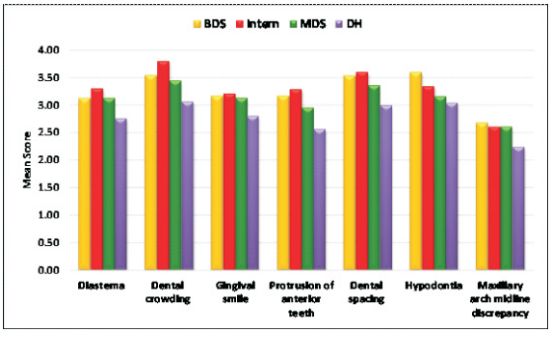
There is less agreement on the impact of a maxillary arch midline discrepancy, indicating a more varied perception of its influence on facial attractiveness. This data underscores the importance of dental aesthetics in overall facial attractiveness and the varying degrees of awareness and agreement among individuals on different dental issues.

Perception about Characteristics of Aesthetic of Smile



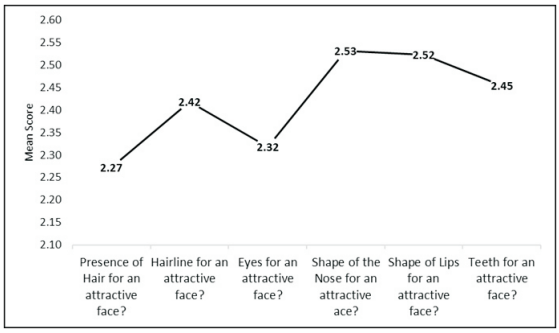
The Friedmann test, which evaluates differences between multiple related groups, indicated a chi-square value of 294.71 with a p-value less than 0.001. This result suggests that there are statistically significant differences in how the various dental characteristics are perceived in terms of their impact on smile aesthetics. The low p-value indicates that these differences are highly unlikely to be due to chance.

Association of Qualification with Perception about Characteristics of Aesthetic of Smile



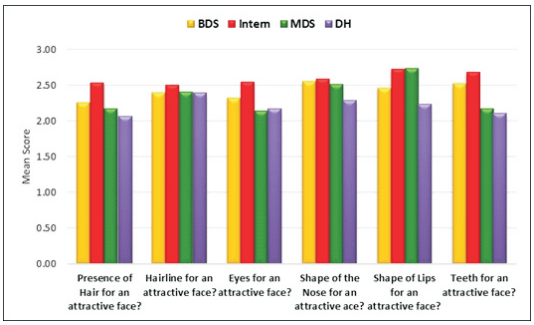
Finally, the maxillary arch midline discrepancy was perceived similarly across groups, with mean values of 2.69 for BDS, 2.61 for interns, 2.61 for MDS, and 2.24 for DH. The chi-square value of 3.28 and a p-value of 0.350 suggest no significant difference.

Perception about Facial Features for Attractive Face



The Friedmann test, which evaluates differences between multiple related groups, indicated a chi-square value of 35.51 with a p-value less than 0.001. This result suggests that there are statistically significant differences in how the various facial features are perceived in terms of their contribution to attractiveness, with the low p-value indicating that these differences are not due to chance.

Association of Qualification with Perception about Facial Features for Attractive Face



While the shape of lips approached significance, suggesting some differences in perceptions, overall, the Kruskal-Wallis test results highlight that these differences are not pronounced enough to be considered statistically significant. This underscores the complexity and subjectivity in perceptions of facial attractiveness across different professional qualifications.

Discussion:

In social psychology, the "what is beautiful is good" stereotype was tested by Dion et al. in 1972[5], and it denotes that human beings attribute positive qualities to attractive individuals and vice versa. Dental schools are responsible for ensuring the graduation of experienced clinicians who are independently qualified to practice dentistry. In current dental practice, esthetic dentistry is of utmost importance. Dental students are usually required to treat patients during their undergraduate training. Therefore, to reach an accurate diagnosis and to plan the required treatment, it is crucial to

teach dental students the principles of dentofacial esthetics.[6] In a meta-analysis conducted by Langlois et al[7], physical attractiveness received more positive judgement and was noted to be an advantage for both children and adults in terms of academic performance.

A study investigating knowledge about various dental characteristics that affect facial aesthetics collected responses from individuals on whether certain dental issues impact the aesthetics of a smile, categorizing the responses into "Yes," "No," and "Maybe," with corresponding percentages. The majority of respondents, 78.9%, believe that a midline diastema affects facial aesthetics, dental crowding by 79.5%, a gummy smile by 70.4% protrusion of anterior teeth by 75.7%, Dental spacing by 83.2%, Hypodontia by 75.7%, a maxillary arch midline discrepancy by 51.0%. The purpose of the present study reveal a strong consensus among respondents that various dental characteristics, such as midline diastema, dental crowding, gummy smile, protrusion of anterior teeth, dental spacing, and hypodontia, significantly affect facial aesthetics, there are statistically significant differences in how the various dental characteristics are perceived in terms of their impact on smile aesthetics.

In our study, dental crowding, diastema, and hypodontia are perceived to have the most significant impact on the aesthetics of a smile. Characteristics such as diastema, gingival smile, and protrusion of anterior teeth also affect smile aesthetics but to a slightly lesser extent. Maxillary arch midline discrepancy is perceived as the least impactful, with more variability in opinions. The statistical analysis confirms that these perceptions vary significantly, highlighting the diverse views on what constitutes an aesthetically pleasing smile. There are statistically significant differences in how the various dental characteristics are perceived in terms of their impact on smile aesthetics ($p<0.001$).

However, the findings support various research that shows a link between dental knowledge and esthetic perception of dentofacial features. Armalaite et al[1] assessed how the characteristics of smiles are perceived by dental students. They reported that among dental students, fifth year dental students were more critical when evaluating smile esthetics. Alhammadi et al[8] reported that clinical training has a significant positive effect on smile esthetic evaluation. This is, however, contrary to the findings of a study by Sakellaropoulos et al[9] which indicated that education level was not an important factor.

The association of qualifications with perceptions about the characteristics of an aesthetic smile reveals notable variations. When considering the effect of diastema on smile aesthetics, a chi-square value of 5.70 and a p-value of 0.127, indicate no significant difference. For dental crowding, a chi-square value of 8.91 and a significant p-value of 0.031, show a significant difference in perception among qualifications. The gingival smile's impact on aesthetics a chi-square value of 3.67 and a p-value of 0.300 suggest no significant difference. For the protrusion of anterior teeth, a chi-square value was 10.86 with a significant p-value of 0.013, indicating a significant difference in perceptions. A dental spacing chi-square value of 7.23 and a p-value of 0.065 indicate no significant difference. The Hypodontia chi-square value was 11.61 with a significant p-value of 0.009, indicating a significant difference in perception among qualifications. Finally, the maxillary arch midline discrepancy a chi-square value of 3.28, and a p-value of 0.350 suggest no significant difference.

However, the study highlights significant differences in perceptions about dental crowding, protrusion of anterior teeth, and hypodontia among different qualifications, while perceptions about diastema, gingival smile, dental spacing, and maxillary arch midline discrepancy show no significant differences. According to the literature, poor dental aesthetics has been associated with decreased self-confidence and is considered to be a social, occupational, and academic disadvantage. Younger generations are attaching increasing importance to all aspects of their appearance.[10]

Several studies have already investigated the influence of age on lip-to-tooth relationship and also seek to obtain the best harmony of dentition, lips, nose, and eyes.[11] Chrng JHC et al[12] reported the factors affecting the smile esthetic perception in different identities (layperson, general dentist, and orthodontist) and detected the extent of their association with smile perception. Bhuvaneswaran M.[13] stated thatas clinicians is to achieve pleasing composition in the smile by creating an arrangement of various esthetic elements.

In this study, there are statistically significant differences in how the various facial features are perceived in terms of their contribution to attractiveness, with the low p-value indicating that these differences are not due to chance. Therefore, this study focused on all the examined facial features that play a

role in perceived attractiveness, the shape of the nose and lips are particularly significant. The presence of hair and the hairline are relatively less critical, though still important, while the eyes and teeth also contribute notably to facial attractiveness. The statistical analysis confirms that these features' perceived importance varies significantly, highlighting the complexity of human perceptions of beauty.

However, in conclusion, the study indicates that perceptions of various facial features' importance for an attractive face show some variability based on qualifications, but most differences are not statistically significant (p=0.197). The presence of hair, hairline, eyes, the shape of the nose, the shape of lips, and teeth all contribute to attractiveness, with minor variations in perceived importance among BDS, interns, MDS, and DH. While the shape of lips approached significance, suggesting some differences in perceptions, overall, the Kruskal-Wallis test results highlight that these differences are not pronounced enough to be considered statistically significant. This underscores the complexity and subjectivity in perceptions of facial attractiveness across different professional qualifications.

Conclusion:

There is a difference in perception of smile aesthetics between the dental students. Students in their last year of under graduate dental education, and postgraduate ranked the image of the ideal smile as one of the most aesthetically pleasing smiles. A smile with dental crowding was considered significantly less pleasing to dental students whilst preclinical students found dental spacing significantly less pleasing than clinical students. The ethnicity and upbringing of students had no statistically significant effect on smile perception..

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