ORIGINAL ARTICLE

The Perception of Smile Arc and Buccal Corridor in Medical and Dental Undergraduate Students of Peshawar, Pakistan: A Descriptive Cross-sectional Study

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ABSTRACT

Objective: To compare smile aesthetics perceptions, focusing on components such as smile arc and buccal corridor, between pre-clinical medical and dental students.

Study Design: A descriptive cross-sectional study.

Place and Duration of Study: The study was conducted at the Department of Medical and Dental Education for undergraduate students of Peshawar Medical and Dental College, Peshawar, Pakistan from June 2023 to January 2024.

Methods: Using Cochran's formula, a descriptive cross-sectional study was conducted on 196 participants using a non-probability consecutive sampling technique. Undergraduate medical and dental students aged 21 to 28 from specific colleges in Pakistan were included. Participants evaluated digitally altered images of a female undergraduate student's smile using a 7-point Likert scale. An independent t-test was applied to compare perceptions among the two groups.

Results: Among 196 participants, 143 (72.96%) were female, and 53 (27.04%) were male, with a mean age of 25.0±1.96 years. Dental students were exclusively comprised of females, while medical students had a higher male proportion (54.08%). A comparison of buccal corridor perception between pre-clinical medical and dental students showed that dental students generally rated wider corridors less favorably. Significant differences were observed at 5 mm and 15 mm corridors (*P*=0.017 and *P*=0.044, respectively). A significant difference was observed for the widest corridor (25 mm) (*P*=0.001). A comparison of smile arc perception between pre-clinical medical and dental students revealed no significant difference in the ideal smile arc (*P*=0.412). However, significant differences were found for the flat smile arc (*P*=0.005). No significant difference was observed for the reverse smile arc (*P*=0.307).

Conclusion: Preclinical medical and dental students have different perceptions of smile aesthetics, particularly regarding buccal corridor width and smile arc.

Keywords: *Aesthetics, Cross-Sectional Studies, Dental Students, Female, Perception.*

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Introduction

The significance of physical appearance, particularly facial aesthetics and smiling, cannot be overstated in shaping human behavior, social interactions, and overall success.[1] Research confirms the positive impact of attractiveness on relationships across various age groups.[2] Recently, there has been a heightened focus on facial esthetics, with smiles recognized as crucial indicators of social and psychological well-being.[3] Smiles convey warmth and approachability, facilitating meaningful connections and enhancing overall happiness.[4]

A balanced smile is defined by an upper lip extending to the gum line and displaying an upward or straight curve from the philtrum to the corners of the mouth.[5] The upper teeth align with the lower lip border, with little to no space between the teeth and the cheeks.[6] The corners of the mouth and the frontal plane of the teeth align with the line of sight, and the dental and gum elements are seamlessly integrated, resulting in a harmonious appearance.

The "Smile arc" refers to the relationship between the upper incisal line, which follows the curvature of the lower lip when smiling, and the incisal edges of the upper front teeth. A harmonious smile, known as a consonant, occurs when these lines share the same curvature.[7] However, a smile may initially be categorized as non-consonant if they do not run parallel. Non-consonant smiles can take two forms: "straight" or "Flat occlusal plane," where the curvature of the upper teeth is flatter than that of the lower lip, or "reverse," where the curvature of the upper teeth opposes that of the lower lip.[8]

Buccal corridors, also known as lateral dark or negative space, refer to the bright area visible between the outer surface of the maxillary back teeth and the inner lining of the soft tissues around the mouth corners and cheeks during smiling.[9] Originally defined by Frush and Fisher, these corridors significantly impact smile aesthetics, influencing perceptions of attractiveness and facial harmony.[10] Their appearance varies among individuals due to tooth size, arch shape, and smile width.[11] In cosmetic dentistry and orthodontics, optimizing buccal corridors is crucial for achieving an aesthetically pleasing smile, often through treatments such as orthodontic adjustments or dental restorations.[12]

Both medical and dental healthcare professionals interact with the general population regularly. The psychosocial aspect of health is crucial, with a person's smile playing a significant role in their psychological well-being. The insights from this study will enable us to develop awareness campaigns and educational initiatives to enhance medical professionals' knowledge and practices, leading to improved referrals and overall healthcare provision. Additionally, this will inform the design of dental student curricula, specifically emphasizing smile aesthetics.

This study aimed to compare the perceptions of smile aesthetics, focusing on components such as smile arc and buccal corridor, between pre-clinical medical and dental undergraduate medical and dental students of both genders.

Methods

The descriptive cross-sectional study was conducted in the Department of Medical and Dental Education for undergraduate students of Peshawar Medical and Dental College, Peshawar KPK, Pakistan from June 2023 to January 2024 on 196 participants using a non-probability consecutive sampling technique. Undergraduate medical and dental students of both genders, Pakistani nationals (based on NICI), aged between 21 and 28 years, were included. Written informed consent was obtained from all participants after an in-depth explanation of the study. The participants were assured that participation was voluntary and anonymous. Foreign students and those with mental issues using anxiolytics (determined by history) were excluded. Ethical approval for conducting this study was obtained from the Institutional Review Board of Prime Foundation Pakistan (Prime/IRB/2023-1067) before commencement on dated: 20th January 2023. The sample size was 196 (98 medical and 98 dental students), calculated through OpenEpi software with a 7% margin of error and a 95% confidence level, using a 50.8% frequency of good perception for a consonant smile arc among dental students.[13]

A photograph of a female undergraduate student with a near-ideal smile and facial profile was cropped and altered using Adobe Photoshop CS6. Initially, the original picture lacked any buccal corridor space. Through digital modification, the dark space was incrementally increased, progressing from 0% to 5%, 15%, and finally 25% across three images. This set comprised two images with no buccal corridors, one ideal image, and two images displaying excessive buccal corridors. The smile arc was also altered in Photoshop to create a flat and reverse smile.

The students were given a color sheet containing photographs and instructed to evaluate the aesthetics of the digital images using a 7-point Likert scale, where one indicated extremely unattractive and 7 indicated extremely attractive. Each

participant was allotted 30 seconds to rate each photograph. The participants' age and gender were recorded alongside their assessments.

The data were analyzed using SPSS version 22. Mean and standard deviation (SD) were calculated for continuous variables such as age and Likert scores, while percentages were computed for qualitative data. An independent samples t-test was conducted to compare smile preferences between medical and dental students for variables such as smile arc and buccal corridor. A significance level of $P \leq 0.05$ was considered statistically significant.

Results

In a study with 196 participants, 143 (72.96%) were female, and 53 (27.04%) were male. The mean age of the participants was 25.0±1.96 years. There was no significant difference in the mean age between dental and medical students, with both groups having a mean age of 25.0 ± 1.97 years (*P*=0.971). However, there is a notable discrepancy in gender distribution between the two groups: all dental students were female (100.00%, n=98). In contrast, medical students had a higher proportion of males (54.08%, n=53) compared to females (45.92%, n=45) (*P*<0.001). (Table-1).

Table-2 compares buccal corridor perception between pre-clinical medical and dental students. Mean scores ± standard deviations are provided for each corridor width. For the 0 mm corridor, dental students had a mean score of 6.84 ± 0.714, while medical students had a mean score of 6.7 ± 0.578, with no significant difference found (*P*=0.15). At 5 mm, dental students had a mean score of 6.3 ± 1.2, compared to medical students with 6.7 ± 1.1. A significant difference was observed (*P*=0.017). Similarly, at 15 mm, dental students reported a mean score of 4.1 ± 1.4, and medical students had a mean score of 4.6 ± 1.4, with a significant difference noted (*P*=0.044). For the broadest corridor (25 mm), dental students had a mean score of 4.4 ± 3.2, whereas medical students had a lower mean score of 3.0 ± 2.4. A highly significant difference was observed (*P*=0.001).

Table-3 compares smile arc perception between pre-clinical medical and dental students. Dental students reported a mean score of 7.0 ± 2.1 for the ideal smile arc, while medical students reported a slightly higher mean score of 7.5 ± 1.6. However, this difference was not statistically significant (*P*=0.412). In contrast, for the flat smile arc, dental students had a mean score of 3.3 ± 1.4, while medical students had a slightly higher mean score of 3.8 ± 0.9, with a statistically significant difference observed between the two groups (*P*=0.005). For the reverse smile arc, dental

Table-1: Age and gender distribution of the participants in both group

Variable	Characteristic	Dental student	Medical student	*Test Score*	*P*-value
Age	Mean±SD	25.0±1.97	25.0±1.97	0.68*	0.971*
Gender	Female	98 (100.00)	45 (45.92)	72.643a**	<0.001**
	Male	0 (0.00)	53 (54.08)		

*Student t-test, ** Chi-square test*

Table-2: Comparison of buccal corridor perception between pre-clinical medical and dental students

Buccal Corridor	Characteristics	Dental Student	Medical Student	*Test* Scores*	*P*-value*
0 mm	Mean ± SD	6.84 ± 0.714	6.7 ± 0.578	1.43	0.15
5 mm wide	Mean ± SD	6.3 ± 1.2	6.7 ± 1.1	-2.41	0.017
15 mm wide	Mean ± SD	4.1 ± 1.4	4.6 ± 1.4	-2.02	0.044
25 mm wide	Mean ± SD	4.4 ± 3.2	3.0 ± 2.4	-3.41	0.001

**Independent samples t-test*

Table-3: Comparison of smile arc perception between pre-clinical medical and dental students

Variable	Characteristics	Dental Student	Medical Student	*Test* Score	*P*-value
Ideal Smile arc	Mean ± SD	7.0 ± 2.1	7.5 ± 1.6	-2.054	0.041
Flat Smile arc	Mean ± SD	3.3 ± 1.4	3.8 ± 0.9	-2.863	0.005
Reverse Smile arc	Mean ± SD	1.8 ± 1.4	2.0 ± 1.6	-1.024	0.307

students reported a mean score of 1.8 ± 1.4, and medical students had a slightly higher mean score of 2.0±1.6, with no statistically significant difference observed (*P*=0.307). (Figure.1).

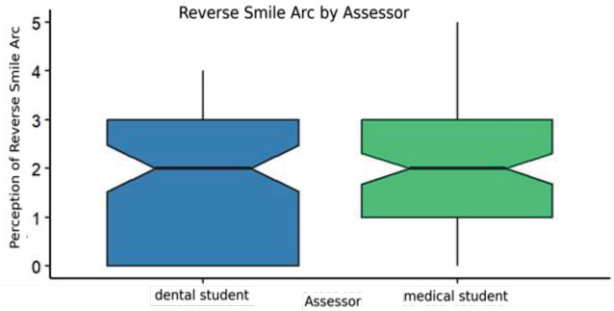

Fig.1: Visualization of reverse smile arc perception between medical and dental students

Discussion

Physical well-being and appearance are attractions, and they are complex concepts that can vary in definition depending on various factors.[14]

In our study, we observed that medical students generally rated aesthetic parameters, particularly buccal corridor and smile arc, with higher scores compared to dental students. This finding suggests that medical students may have a heightened sensitivity or preference toward certain aspects of smile aesthetics.[15] The appreciation of smile aesthetics is not limited to dental professionals but extends to individuals in various medical fields, indicating a broader societal emphasis on physical appearance.[16] However, it's noteworthy that medical students rated an extensive buccal corridor lower than dental students.[17] This discrepancy could stem from differing perspectives or training backgrounds. Medical students might prioritize different aspects of facial aesthetics or have varying criteria for evaluating smile aesthetics compared to dental students. It could also reflect differences in exposure or training related to oral health and dental aesthetics between the two groups.[18]

The previous study analyzed the perception of smile aesthetics among 182 dental students and reported that dental students had higher perception scores for a consonant smile arc and ideal buccal corridor compared to altered ones.[19] A comparative study on smile aesthetics perception between preclinical and clinical dental students revealed distinct differences. These findings highlight potential shifts in perception as students' progress in their dental education and clinical experience.[20]

The earlier investigation focused on examining and contrasting the perceptions of smile aesthetics and attractiveness among dental students and their counterparts in health-related fields. The study categorized participants into age groups of 20-22 and 23-25 years. Modified intraoral smile images illustrating seven distinct clinical cases were provided alongside a questionnaire to Taif University, Kingdom of Saudi Arabia, students. The study involved 120 dental students and 307 students from other health colleges. Notably, the findings unveiled a statistically significant contrast in smile perception between these two cohorts. the results are similar to our findings.

Another study assessed how buccal corridor width affects smile attractiveness in women of different face types, as perceived by orthodontists, prosthodontists, dental students, and non-dental students. Images of three women representing various face shapes were digitally altered to display five buccal corridor widths (ranging from 2% to 28%). Participants evaluated 15 images in total. Results indicated that orthodontists and non-dental students favored wide smiles with minimal buccal corridor width for mesoprosopic and euryprosopic face shapes, while a slightly wide smile was preferred for leptoprosopic faces. A significant difference in the perception of the buccal corridors was found between dental and non-dental students.[21]

The study's limitations include focusing solely on female participants from dental students, potentially neglecting gender differences in smile perception. Additionally, its findings may not be widely applicable due to the study's narrow scope, which was conducted exclusively within specific dental and medical colleges in Pakistan, limiting its generalizability to other populations or settings. Despite employing a Likert scale for assessment, the subjective nature of aesthetic judgments introduces the possibility of bias, as individual preferences and interpretations may vary. These factors could impact the reliability and validity of the results, highlighting the need for caution when interpreting the findings and considering their broader implications.

Conclusion

Despite the study's limitations, it can be concluded that differences exist in smile aesthetics perceptions between pre-clinical medical and dental students, particularly regarding buccal corridor width and smile arc. These findings highlight the potential impact on patient care, emphasizing the importance of incorporating diverse perspectives into treatment planning and decision-making processes.

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SN: Writing the original draft, proofreading, and approval for final submission
SA: Conception and design of the work
ZI: Validation of data, interpretation, and write-up of results
HAR: Revising, editing, and supervising for intellectual content
SK: Data acquisition, curation, and statistical analysis
WA: Manuscript writing for methodology design and investigation