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RESEARCH ARTICLE
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PATIENT PERCEPTION OF SMILE DESIGN BEFORE AND AFTER PROSTHODONTIC TREATMENT

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ABSTRACT

Background: To assess patient perception of smile design before and after prosthodontic treatment and to analyze demographic and socioeconomic factors influencing post-treatment satisfaction.

Methods: This prospective observational study was conducted at the Department of Prosthodontics, Rehman College of Dentistry, Peshawar, from January 2023 to January 2024. A total of 73 patients undergoing prosthodontic treatment were enrolled through consecutive sampling. Demographic details were recorded, and patient perception was assessed before and after treatment using a structured questionnaire and visual analogue scale. Data were analyzed using SPSS version 26. Paired t-test and chi-square test were applied, with $p < 0.05$ considered significant.

Results: The mean overall smile satisfaction improved significantly from 4.2 ± 1.1 before treatment to 8.1 ± 0.9 after treatment ($p < 0.001$). All esthetic parameters, including tooth color, shape, alignment, and smile attractiveness, showed highly significant improvement ($p < 0.001$). Younger patients, those with higher education, and individuals from middle or high socioeconomic backgrounds reported greater post-treatment satisfaction. No significant differences were observed between male and female participants.

Conclusion: Prosthodontic treatment leads to a marked enhancement in patient perception of smile design, contributing to improved esthetic satisfaction and self-confidence. Incorporating patient-reported outcomes into prosthodontic care is essential for achieving holistic treatment success.

Keywords: Smile design, prosthodontic treatment, esthetic dentistry, patient perception, satisfaction, quality of life

INTRODUCTION

A pleasant smile is one of the most influential features of human appearance and has a strong impact on personal identity, self-esteem, and social relationships. In dentistry, the esthetic component of treatment has gained equal importance to functional restoration, as patients increasingly seek interventions that enhance their overall appearance and confidence. Smile design is a multifactorial concept influenced by tooth color, shape, alignment, gingival display, and facial harmony, and even small discrepancies can alter esthetic perception (1-3).

Prosthodontics plays a pivotal role in restoring and improving smile esthetics in patients with missing, discolored, or malformed teeth. Advances in restorative materials and techniques, such as all-ceramic crowns, veneers, implant-supported prostheses, and esthetic dentures, have expanded treatment options to meet patients' esthetic expectations. Research indicates that patients place high value on dental appearance, often linking it to social acceptance, professional opportunities, and psychological well-being (4-6).

Several studies have documented improvements in esthetic perception and quality of life following prosthodontic rehabilitation. For example, fixed and implant-supported prostheses have been associated with higher satisfaction and enhanced social confidence. However, esthetic perception may vary with age, gender, education, and socioeconomic background, underscoring the importance of considering demographic differences in treatment planning (7-9).

Despite the growing body of evidence, limited data are available from local populations where awareness of esthetic dentistry is increasing but still influenced by cultural and socioeconomic factors. This study was therefore conducted to assess changes in patient perception of smile design before and after prosthodontic treatment in a Pakistani population and to determine demographic factors that influence satisfaction.

METHODOLOGY

This research was designed as a prospective observational study and was carried out at the Department of Prosthodontics, Rehman College of Dentistry, Peshawar. The study duration extended from January 2023 to January 2024.

A total of 73 participants were included in the study. The sample size was determined based on feasibility and the average patient load in the prosthodontics department during the study period. Patients were selected using a consecutive sampling technique, where every eligible patient who reported to the outpatient clinic and fulfilled the inclusion criteria was invited to participate until the required sample was achieved.

Inclusion Criteria

- Adults aged 20 years and above requiring prosthodontic treatment for missing or compromised teeth.
- Patients undergoing treatment with fixed partial dentures, removable dentures, implant-supported prostheses, crowns, or veneers.
- Individuals willing to provide informed consent and participate in both pre- and post-treatment assessments.

Exclusion Criteria

- Patients with untreated periodontal disease or poor oral hygiene that could interfere with esthetic outcomes.
- Patients with systemic conditions affecting oral health perception (e.g., uncontrolled diabetes, psychological disorders).
- Individuals who had undergone major maxillofacial surgery or radiotherapy.
- Patients unwilling to return for follow-up evaluation after treatment completion.

After obtaining ethical approval from the Institutional Review Committee of Rehman College of Dentistry, eligible patients were enrolled. A written informed consent was taken, ensuring voluntary participation. Baseline demographic details (age, gender, educational status, occupation, marital status, socioeconomic background, and residential area) were recorded.

Before treatment, each participant was asked to self-assess their smile perception using a structured questionnaire and a Visual Analogue Scale (VAS) ranging from 0 (least satisfied) to 10 (most satisfied). Domains included overall smile satisfaction, tooth color, tooth shape and size, alignment, gingival display, smile attractiveness, and self-confidence while smiling in public.

Following the completion of prosthodontic treatment, the same questionnaire was re-administered at the final follow-up visit (two weeks after prosthesis insertion). Patients were encouraged to respond independently without external influence.

Participants received prosthodontic treatment according to their individual needs and clinical indications. Treatments included fixed partial dentures, removable partial or complete dentures, implant-supported prostheses, and esthetic restorations such as crowns and veneers. All procedures were carried out by postgraduate trainees under supervision of senior prosthodontists, following standard treatment protocols.

The primary outcome was change in smile perception scores before and after prosthodontic treatment. The secondary outcomes included the association of demographic and socioeconomic variables with post-treatment satisfaction.

Data were entered and analyzed using SPSS version 26. Continuous variables (such as perception scores) were expressed as mean ± standard deviation (SD). Categorical variables (such as gender, educational level, socioeconomic status, and type of prosthesis) were presented as frequencies and percentages. Paired t-test was applied to compare mean perception scores before and after treatment. Chi-square test and independent t-test were used to assess associations between demographic factors and post-treatment satisfaction. A p-value of <0.05 was considered statistically significant.

RESULTS

The study included a total of 73 participants. The majority were between 31–40 years (30.1%), followed by those aged 41–50 years (27.4%). A slightly higher proportion of females (53.4%) were enrolled compared to males (46.6%). Regarding educational status, 43.8% were graduates, while 27.4% had postgraduate education, and 28.8% had primary or secondary education. Socioeconomic distribution showed that most participants belonged to the middle-income group (41.1%), followed by the low-income group (37.0%), and only 21.9% were from high-income households.

Table 1. Demographic Characteristics of Study Participants (n = 73)

Variable	Category	Frequency (%)
Age (years)	20–30	18 (24.7%)
	31–40	22 (30.1%)
	41–50	20 (27.4%)
	>50	13 (17.8%)
Gender	Male	34 (46.6%)
	Female	39 (53.4%)
Educational Level	Primary/Secondary	21 (28.8%)
	Graduate	32 (43.8%)
	Postgraduate	20 (27.4%)
Socioeconomic Status	Low	27 (37.0%)
	Middle	30 (41.1%)
	High	16 (21.9%)

In terms of treatment characteristics, fixed partial dentures were the most commonly provided prosthesis (38.4%), followed by removable dentures (27.4%). Implant-supported prostheses were received by 20.5% of participants, while 13.7% underwent veneers or crown placement. More than half of the prostheses were placed in the anterior region (56.2%), while 43.8% were posterior restorations. Only about one-fourth of the participants (26.0%) had a previous history of prosthodontic treatment.

Table 2. Clinical Characteristics of Prosthodontic Treatment (n = 73)

Variable	Category	Frequency (%)
Type of Prosthesis	Fixed partial denture	28 (38.4%)
	Removable denture	20 (27.4%)
	Implant-supported prosthesis	15 (20.5%)
	Veneers/Crowns	10 (13.7%)
Location of Prosthesis	Anterior	41 (56.2%)
	Posterior	32 (43.8%)
Previous Prosthodontic History	Yes	19 (26.0%)
	No	54 (74.0%)

A marked improvement was observed in patient perception following prosthodontic treatment. The mean overall smile satisfaction increased from 4.2 ± 1.1 before treatment to 8.1 ± 0.9 after treatment ($p < 0.001$). Similarly, the mean score for smile attractiveness improved from 4.5 ± 1.3 to 8.3 ± 1.0 ($p < 0.001$). Tooth color satisfaction showed a notable rise from 3.9 ± 1.4 to 7.8 ± 1.2 ($p < 0.001$). Tooth shape and size, alignment and symmetry, as well as self-confidence while smiling in public, all showed highly significant improvements with p-values <0.001. These findings clearly demonstrate the positive impact of prosthodontic intervention on esthetic perception and psychosocial well-being.

Table 3. Patient Perception of Smile Design Before and After Treatment

Perception Variable	Before Treatment (Mean ± SD)	After Treatment (Mean ± SD)	p-value
Overall smile satisfaction	4.2 ± 1.1	8.1 ± 0.9	<0.001*
Smile attractiveness (VAS 0–10)	4.5 ± 1.3	8.3 ± 1.0	<0.001*
Tooth color satisfaction	3.9 ± 1.4	7.8 ± 1.2	<0.001*
Tooth shape/size satisfaction	4.1 ± 1.3	8.0 ± 1.0	<0.001*
Alignment & symmetry	4.3 ± 1.2	8.2 ± 1.1	<0.001*
Confidence while smiling	4.0 ± 1.5	8.4 ± 1.0	<0.001*

*Significant at $p < 0.05$

When comparing post-treatment satisfaction across demographic factors, younger participants (≤40 years) reported higher satisfaction (8.5 ± 0.8) compared to older participants (>40 years) (7.9 ± 1.0), with the difference being statistically significant ($p = 0.04$). Educational level also influenced satisfaction, as participants with graduate or postgraduate education scored higher (8.4 ± 0.9) than those with only primary or secondary education (7.8 ± 1.0; $p = 0.03$). Socioeconomic status had a significant effect as well, with higher satisfaction among middle/high-income groups compared to low-income participants ($p = 0.02$). Gender differences were not statistically significant ($p = 0.21$).

Table 4. Association between Demographic Factors and Post-Treatment Satisfaction

Variable	Category	Mean Satisfaction Score (±SD)	p-value
Age (years)	≤40	8.5 ± 0.8	0.04*
	>40	7.9 ± 1.0	
Gender	Male	8.0 ± 1.1	0.21
	Female	8.3 ± 0.9	
Educational Level	Primary/Secondary	7.8 ± 1.0	0.03*
	Graduate/Postgraduate	8.4 ± 0.9	
Socioeconomic Status	Low	7.7 ± 1.1	0.02*
	Middle/High	8.5 ± 0.8	

*Significant at $p < 0.05$

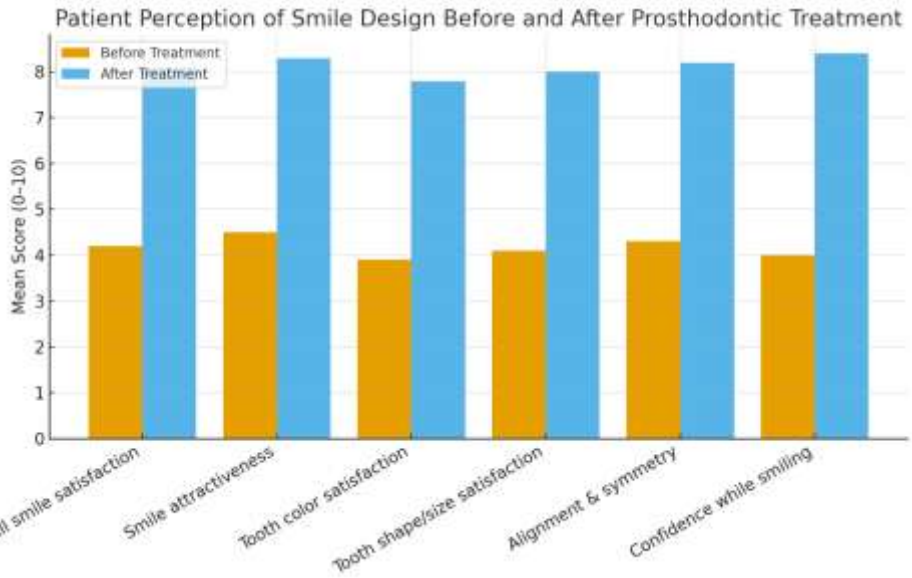

Figure 1: bar graph comparing patient perception scores before and after prosthodontic treatment. It clearly illustrates the significant improvement across all variables, especially in overall satisfaction, confidence, and smile attractiveness.

DISCUSSION

The findings of this study highlight the significant improvement in patient perception of smile design following prosthodontic treatment. Participants reported substantial gains in overall satisfaction, attractiveness of their smile, tooth color, tooth shape, alignment, and confidence levels after the placement of prostheses. These results confirm that prosthodontic rehabilitation not only restores oral function but also has a profound impact on esthetics and psychosocial well-being.

Our results are in line with previous studies that emphasized the esthetic benefits of prosthodontic therapy. Studies reported that patients undergoing fixed prosthodontic treatment perceived significant improvement in smile attractiveness and oral esthetics (10-12). Similarly, a studies demonstrated that patient-reported outcomes such as confidence and social interactions improved markedly after anterior restorations. These findings support the current evidence that esthetic dentistry contributes substantially to patient satisfaction and quality of life (13-15).

In the present study, demographic factors influenced perception to some extent. Younger patients and those with higher education or better socioeconomic status reported higher post-treatment satisfaction scores. This may be attributed to greater esthetic awareness and higher expectations in these groups. A comparable observation found that younger individuals placed more importance on esthetics compared to older patients, thereby showing higher appreciation for prosthodontic outcomes (16).

Interestingly, gender did not significantly affect satisfaction levels in our cohort. This is consistent with the findings of studies noted that both male and female patients expressed comparable levels of esthetic satisfaction after prosthodontic rehabilitation. This suggests that perceived esthetic improvement is valued equally across genders (17, 18).

The marked improvement in confidence while smiling and interacting socially post-treatment reflects the broader psychosocial role of esthetics in dentistry. Previous research highlighted that dental appearance strongly influences self-esteem and interpersonal relations. Our findings further strengthen the argument that prosthodontic treatment should be considered not only for functional rehabilitation but also as an intervention that improves psychosocial health (19, 20).

While this study provides valuable insights, it is important to acknowledge its limitations. The sample size, though adequate, was limited to a single center, which may restrict generalizability. Additionally, the follow-up period was short, and long-term perceptions of smile design could not be assessed. Despite these limitations, the study offers clear evidence of the positive impact of prosthodontic treatment on patient-perceived esthetics.

CONCLUSION

This study demonstrates that prosthodontic treatment significantly enhances patients' perception of their smile, leading to improved esthetic satisfaction and psychosocial confidence. Improvements were consistent across multiple domains, including tooth color, shape, alignment, and overall attractiveness. Younger age, higher education, and better socioeconomic status were associated with greater satisfaction, while gender had no significant influence.

The findings underscore the importance of integrating esthetic considerations into prosthodontic care and highlight the role of patient-centered outcomes in treatment planning. Future studies with larger sample sizes, multicenter participation, and longer follow-up are recommended to further explore the long-term impact of prosthodontic rehabilitation on smile perception and quality of life.

REFERENCES

1. Cattoni F, Tetè G, Uccioli R, Manazza F, Gastaldi G, Perani DJIjoer, et al. An fMRI study on self-perception of patients after aesthetic implant-prosthetic rehabilitation. 2020;17(2):588.
2. Pantea M, Tancu AMC, Petre A, Imre M, Ionescu EJJoM, Life. Elderly patients' perception of previewing the prosthetic treatment outcome. 2020;13(1):82.
3. Renuka S, Kirubagaran SS, Sankari MJDIT. Perception of prosthodontic need of patients during and after extraction--A survey. 2020;14(2).
4. Saini R, Thakur N, Goyal RJ, Rai KS, Bagde H, Dhopte AJC. Analysis of smile aesthetic changes with fixed orthodontic treatment. 2022;14(12).
5. Zotti F, Pappalardo D, Capocasale G, Sboarina A, Bertossi D, Albanese MJC, cosmetic, et al. Aesthetic dentistry, how you say and how you see: A 500-people survey on digital preview and color perception. 2020:377-89.
6. Carek A, Brkic B, Cigic M, Jelavic I, Kurilic AJPD. Fixed prosthodontic patient satisfaction survey. 2021;33(Suppl 4):1320-6.
7. Pinzan-Vercelino CRM, Costa ACS, Ferreira MC, Bramante FS, Fialho MPN, de Araújo Gurgel JJTJopd. Comparison of gingival display in smile attractiveness among restorative dentists, orthodontists, prosthodontists, periodontists, and laypeople. 2020;123(2):314-21.
8. KOMMI V, SASHANKA K, AS SGJIJoPR. Public Awareness and Knowledge on Prosthodontic Treatments-A Survey. 2020.
9. Benetti GS, Dotto L, Maroli A, Barbon F, Sanchez-Ayala A, Bacchi AJBJoOS. Patients' perception about the outcomes of prosthetic treatment in Southern Brazil: a cross sectional study. 2020;19:e209398-e.
10. Ngoc VTN, Tran D-K, Dung TM, Anh NV, Nga VT, Anh LQ, et al. Perceptions of dentists and non-professionals on some dental factors affecting smile aesthetics: A study from Vietnam. 2020;17(5):1638.
11. Rodrigues A, Dhanania S, Rodrigues RJBo. "If I have teeth, I can smile." Experiences with tooth loss and the use of a removable dental prosthesis among people who are partially and completely edentulous in Karnataka, India. 2021;7(1):34.
12. Zubair N, Raza M, Khan MS, Ubaid B, Alam A, Hashim L, et al. Evaluation of patient satisfaction with fixed Prosthodontic therapy visiting Prosthodontic department of a Teaching Dental Hospital: Patient Satisfaction Towards Fixed Prosthodontic therapy. 2022:212-5.
13. Jafri Z, Ahmad N, Sawai M, Sultan N, Bhardwaj AJJoob, research c. Digital Smile Design-An innovative tool in aesthetic dentistry. 2020;10(2):194-8.
14. Alikhasi M, Yousefi P, Afrashtehfar KIJDCoNA. Smile design: Mechanical considerations. 2022;66(3):477-87.
15. Martins CM, Lacerda PBG, Maenosono RM, Catelan A, de Souza Batista VEJR, Society, Development. Perception of smile attractiveness by dentistry professionals, dental students and laypeople before and after esthetic procedures. 2021;10(3):e50010313690-e.
16. Patel TB, Mathur S, Upadhyay SR, Shah TDJTJoIPS. A proportional appraisal of smile perception by laypersons, dental professionals, and a smile designing software: An: in vivo: study. 2021;21(4):391-6.

17. Sermsiripoca K, Pisarnturakit PP, Mattheos N, Pimkhaokham A, Subbalekha KJCid, research r. Comparing pre-and post-treatment patients' perceptions on dental implant therapy. 2021;23(5):769-78.
18. Lv L, He W, Ye H, Cheung K, Tang L, Wang S, et al. Interdisciplinary 3D digital treatment simulation before complex esthetic rehabilitation of orthodontic, orthognathic and prosthetic treatment: workflow establishment and primary evaluation. 2022;22(1):34.
19. Cattoni F, Chirico L, Merlone A, Manacorda M, Vinci R, Gherlone EFJIJoER, et al. Digital smile designed computer-aided surgery versus traditional workflow in “all on four” rehabilitations: a randomized clinical trial with 4-years follow-up. 2021;18(7):3449.
20. Pham TAV, Nguyen PAJIdj. Morphological features of smile attractiveness and related factors influence perception and gingival aesthetic parameters. 2022;72(1):67-75.