Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies *NLM ID: 101716117*

Journal home page: www.jamdsr.com doi: 10.21276/jamdsr Indian Citation Index (ICI) Index Copernicus value = 100

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Original Research

Multidisciplinary Assessment of Factors Associated With Successful Fixed Prosthodontic Therapy: An Original Study

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ABSTRACT:
Context: Fixed partial dentures (FPDs) and crowns are standard prosthodontic treatments to restore esthetics, phonetics and function. Despite material and technique advancements, postoperative discomfort remains a frequent patient complaint.
Aim: To evaluate postoperative discomfort in patients rehabilitated with crowns and FPDs and to analyse associations between prosthesis type/material and specific discomfort domains. **Settings and Design:** A cross-sectional, questionnaire-based study conducted in the Department of Prosthodontics at a dental teaching institution. **Methods and Material:** 58 patients aged ≥18 years who had received crowns and/or FPDs within the last 12-24 months were included. A structured, validated questionnaire assessed eight domains of discomfort: looseness/dislodgement, food impaction, chewing difficulty, pain, fracture, esthetic dissatisfaction, discolouration and unpleasant odor. Patients were categorised by prosthesis type (crowns, bridges and combined restorations) and material (all metal, porcelain fused to metal and all ceramic). **Statistical Analysis Used:** Descriptive statistics were calculated. Associations between prosthesis characteristics and discomfort domains were analysed using Chi-square tests ($p \leq 0.05$). **Results:** Chewing difficulty was the most common complaint in crowns (44.4% all ceramic, 33.3% PFM), bridges (50% PFM) and combined restorations (57.1% PFM). Discolouration was reported mainly in all ceramic crowns (44.4%) while unpleasant odor was highest in PFM restorations (64.3%). Significant associations were found for food impaction in bridges ($p = 0.027$) and pain under combined prostheses ($p = 0.040$).
Conclusions: Postoperative discomfort varied by prosthesis type and material. All ceramic crowns showed highest chewing difficulty and discolouration (44.4%); PFM bridges had the most chewing complaints (50%) and combined restorations revealed significant pain in all metal (21.4%) and all ceramic (14.3%) with PFM showing more odor (64.3%); overall, comfort depended more on design, occlusion and hygiene than on material.
Keywords: Crowns, Fixed Partial Denture, Patient-Reported Outcomes, Postoperative Discomfort, Prosthesis Material

Received: 18 December, 2025 Accepted: 16 January, 2026 Published: 26 January, 2026

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This article may be cited as: Shree N, Goyal MK, Paul G, Mittal V, Saxena I, Madhav. Multidisciplinary Assessment of Factors Associated With Successful Fixed Prosthodontic Therapy: An Original Study. J AdvMed Dent Scie Res 2026; 14(1):80-86.

INTRODUCTION

Fixed partial dentures (FPDs) and crowns are fundamental prosthodontic treatments for replacing missing or structurally compromised teeth, restoring esthetics, phonetics and functional efficiency.[1] Advances in ceramics, metal alloys and adhesive

protocols have improved their clinical performance and longevity.[2] Despite these developments many patients continue to report postoperative discomfort that may compromise satisfaction and treatment outcomes.[3] Postoperative complaints include pain, occlusal disharmony, chewing difficulty, food impaction, halitosis, mobility or dislodgement, esthetic dissatisfaction, fracture and discolouration.[4] These issues are often multifactorial arising from technical errors, marginal misfit, occlusal discrepancies or inadequate oral hygiene.[5,6] Failures are broadly classified as biological, mechanical or esthetic; biological failures include secondary caries or periodontal problems; mechanical failures involve debonding, framework fracture or misfit; esthetic failures relate to shade mismatch or contour discrepancies.[7,8] Importantly, restorations considered clinically sound by the dentist may still be perceived as unsatisfactory by patients.[8] Patient-reported outcome measures (PROMs) are increasingly valued for capturing such perspectives as they provide insights often overlooked during routine clinical assessment.[9] Structured questionnaires such as those adapted from the Oral Health Impact Profile allow systematic evaluation across patient groups and prosthetic modalities.[10,11] The present study employed a structured questionnaire to assess eight domains of postoperative discomfort that include dislodgement, food impaction, chewing difficulty, pain, fracture, esthetic dissatisfaction, discolouration and unpleasant odor in patients rehabilitated with crowns and FPDs fabricated from all metal, all ceramic and porcelain fused to metal (PFM). By incorporating patient perspectives, the study aims to identify common challenges in fixed prosthodontics and provide evidence to improve material selection, design principles and patient education, thereby supporting patient-centred and outcome-based clinical practice. The present study aimed to assess postoperative discomfort in patients with fixed prosthodontic restorations through a structured questionnaire and to analyse associations between the type/material of prosthesis and specific domains of discomfort.

SUBJECTS AND METHODS

This cross-sectional, descriptive, questionnaire-based study aimed at evaluating the prevalence, characteristics and extent of postoperative discomfort among patients treated with crowns and fixed partial dentures (FPDs). Written informed consent was obtained from all patients before inclusion, in accordance with the Declaration of Helsinki (2008).

Sample Size and Participant Selection

Sample size estimation was performed using G*Power software (Version 3.1.9.6), assuming a study power of 85% and a 5% significance level. A minimum of 58 participants was determined as adequate. Eligible participants were adults aged 18 years or older who had received crowns or FPDs within the preceding 12-24 months and were willing to provide informed consent. Exclusion criteria comprised patients with pre-existing oral conditions causing discomfort (e.g., temporomandibular disorders, mucosal lesions); systemic diseases influencing pain perception (e.g., uncontrolled diabetes, neuropathies); cognitive or psychiatric impairments, language barriers or unwillingness to participate.

Questionnaire Development and Validation

The principal tool for data collection was a structured questionnaire consisting of 10 closed-ended questions. The questionnaire domains included prosthesis type, looseness or dislodgement, food impaction, chewing efficiency, pain, fracture or breakage, esthetic satisfaction, discolouration, unpleasant odor and material type (Figure 1). The questionnaire was designed through a review of relevant literature, consultation with prosthodontic experts and adaptation from previously validated tools. Before full-scale administration, the questionnaire was pilot-tested on 10 patients to ensure clarity, internal consistency and comprehensibility.

Data Collection Procedure

Patients were recruited from outpatient records and approached during scheduled visits. Following an explanation of study objectives, written informed consent was obtained. The questionnaire was self-administered under investigator supervision with clarification provided only where necessary, ensuring responses were unbiased.

Study Grouping

Patients were categorized according to two variables: (i) prosthesis type: crowns, FPDs or combined restorations; and (ii) material composition: all metal, porcelain fused to metal (PFM)or all ceramic. This allowed subgroup analysis to determine associations between prosthesis characteristics and reported discomfort.

Statistical Analysis

Data were analysed using SPSS version 27.0. Descriptive statistics summarised frequencies. Chi-square test was applied to evaluate associations between prosthesis characteristics and discomfort domains. A p-value ≤ 0.05 was considered statistically significant.

RESULTS

A total of 58 patients were evaluated for postoperative discomfort following rehabilitation with crowns, bridges or combined fixed prosthodontic restorations. Patients were stratified by type of prosthesis (crowns, bridges and combined restorations) and material used (all metal, all ceramic and PFM).

Crowns: Among patients rehabilitated with crowns, chewing difficulty emerged as the most frequent complaint particularly in all ceramic crowns (44.4%); followed by PFM (33.3%) and all metal crowns (16.7%) (Table 1, Graph 1). Discolouration was also most common in all ceramic crowns (44.4%) while no such complaint was reported with all metal restorations. Food lodgement was more frequently observed in all ceramic (22.2%) and PFM crowns (16.7%) compared to all metal (11.1%). Other factors such as pain, looseness, odor, fracture and esthetic concerns were reported across all materials but did not reach statistical significance ($p > 0.05$).

Bridges: In patients with bridges, chewing difficulty was most frequently reported in PFM (50%); followed by all ceramic (23.1%) and all metal (15.4%) restorations (Table 2, Graph 2). A statistically significant association was noted for food impaction ($p = 0.027$) with higher rates in all metal (11.5%) and all ceramic (11.5%) groups compared to PFM (7.7%). Other discomforts including pain, fracture, esthetic concerns, odor, and discolouration were reported more in PFM bridges; however, these differences were not statistically significant ($p > 0.05$).

Combined Crowns and Bridges: Patients rehabilitated with both crowns and bridges demonstrated more complex discomfort patterns. Chewing difficulty was most prevalent in the PFM group (57.1%). In contrast, pain under the prosthesis showed a significant association with prosthesis material ($p = 0.040$) being more common in all metal (21.4%) and all ceramic (14.3%) restorations (Table 3, Graph 3).

Discolouration (21.4%) and unpleasant odor (64.3%) were predominantly associated with PFM restorations. Although food lodgement was also more frequent in PFM, it did not achieve statistical significance.

Summary: Statistically significant associations were found for food impaction in bridges and pain under prostheses in combined cases whereas other complaints were not significantly material-related.

Figure 1: Domains of the Questionnaire Pattern

S.NO	QUESTIONS	RESPONSE
1.	Type of Prosthesis	Crown/Bridge/Both
2.	Do you feel any Looseness and Repeated Dislodgement of the Prosthesis?	Yes/No
3.	Any Sensation of Food becoming Trapped around the Prosthesis?	Yes/No
4.	Are you able to Chew Food with the Prosthesis?	Yes/No
5.	Do you Feel any Pain Under the Prosthesis?	Yes/No
6.	Did you Experience any Problem Related to Fracture or Breakage of the Prosthesis?	Yes/No
7.	Did you have any Concerns Regarding the Appearance/ Aesthetics of the Prosthesis?	Yes/No
8.	Have you Observed any Changes in Color or Discoloration of the Prosthesis over Time?	Yes/No
9.	Have you ever Noticed any Unpleasant Odor coming from the Prosthesis?	Yes/No
10.	What type of Material is used in your Fixed Partial Denture?	All metal/PFM/All Ceramic

Table 1: Assessment of Specific Factors Contributing to Postoperative Discomfort in Patients with Crowns

FACTORS	Material of Prosthesis	No	Yes	Chi-square value	*p-value*, S/NS
Looseness/Dislodgement of Prosthesis	**All Metal**	**3(16.7%)**	**0(0%)**	**2.813**	**0.245,NS**
	All Ceramic	**6(33.3%)**	**2(11.1%)**		
	PFM	**7(38.9%)**	**0(0%)**		
Food Trap Around Prosthesis	**All Metal**	**1 (5.6%)**	**2(11.1%)**	**0.476**	**0.788,NS**
	All Ceramic	**4(22.2%)**	**4(22.2%)**		
	PFM	**4(22.2%)**	**3 (16.7%)**		

Ability to Chew with Prosthesis	**All Metal**	**0 (0%)**	**3 (16.7%)**	**1.664**	**0.435,NS**
	All Ceramic	**0 (0%)**	**8 (44.4%)**		
	PFM	**1(5.6%)**	**6(33.3%)**		
Pain Under Prosthesis	**All Metal**	**2(11.1%)**	**1(5.6%)**	**0.505**	**0.777,NS**
	All Ceramic	**6(33.3%)**	**2(11.1%)**		
	PFM	**6(33.3%)**	**1(5.6%)**		
Fracture/Breakage of Prosthesis	**All Metal**	**3(16.7%)**	**0(0%)**	**1.324**	**0.516,NS**
	All Ceramic	**7(38.9%)**	**1(5.6%)**		
	PFM	**7(38.9%)**	**0(0%)**		
Esthetic Concerns with Prosthesis	**All Metal**	**3(16.7%)**	**0(0%)**	**1.414**	**0.493,NS**
	All Ceramic	**7(38.9%)**	**1(5.6%)**		
	PFM	**5(27.8%)**	**2(11.1%)**		
Discolouration of Prosthesis	**All Metal**	**3(16.7%)**	**0(0%)**	**5.657**	**0.059,NS**
	All Ceramic	**8(44.4%)**	**0(0%)**		
	PFM	**4(22.2%)**	**3 (16.7%)**		
Unpleasant Odor from Prosthesis	**All Metal**	**3(16.7%)**	**0(0%)**	**2.193**	**0.334,NS**
	All Ceramic	**5(27.8%)**	**3 (16.7%)**		
	PFM	**6(33.3%)**	**1(5.6%)**		

Graph 1: Crown – Discomfort by Material

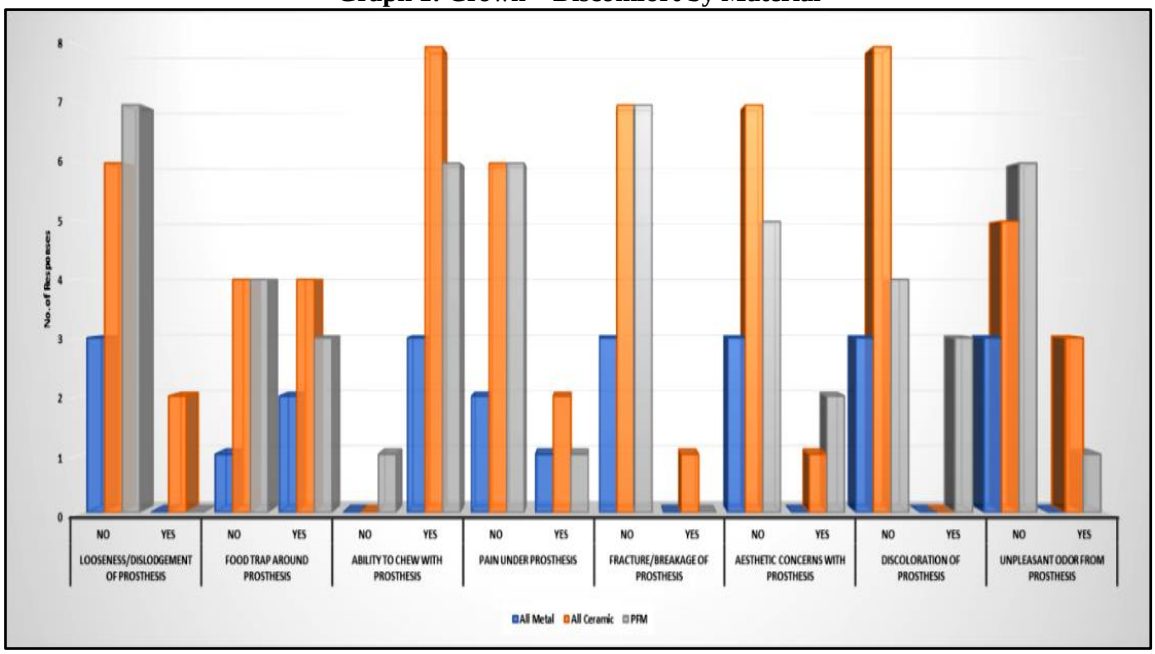


Table 2: Assessment of Specific Factors Contributing to Postoperative Discomfort in Patients with Bridges

FACTORS	Material of Prosthesis	No	Yes	Chi-square value	*p-value,* S/NS
Looseness/Dislodgement of Prosthesis	**All Metal**	**3(11.5%)**	**1(3.8%)**	**0.163**	**0.922,NS**
	All Ceramic	**4(15.4%)**	**2(7.7%)**		
	PFM	**12(46.2%)**	**4(15.4%)**		
Food Trap Around Prosthesis	**All Metal**	**1(3.8%)**	**3 (11.5%)**	**7.222**	**0.027,S**
	All Ceramic	**3 (11.5%)**	**3 (11.5%)**		
	PFM	**12(46.2%)**	**2(7.7%)**		
Ability to Chew with Prosthesis	**All Metal**	**0(0%)**	**4(15.4%)**	**2.120**	**0.347,NS**
	All Ceramic	**0(0%)**	**6(23.1%)**		
	PFM	**3 (11.5%)**	**13(50%)**		
Pain Under Prosthesis	**All Metal**	**4(15.4%)**	**0(0%)**	**0.874**	**0.646,NS**
	All Ceramic	**5(19.2%)**	**1(3.8%)**		
	PFM	**13(50%)**	**3 (11.5%)**		
Fracture/Breakag	**All Metal**	**4(15.4%)**	**0(0%)**	**0.874**	**0.646,NS**

e of Prosthesis	**All Ceramic**	**5(19.2%)**	**1(3.8%)**		
	PFM	**13(50%)**	**3 (11.5%)**		
Esthetic Concerns with Prosthesis	**All Metal**	**3 (11.5%)**	**1(3.8%)**	**0.113**	**0.945,NS**
	All Ceramic	**5(19.2%)**	**1(3.8%)**		
	PFM	**13(50%)**	**3(11.5%)**		
Discolouration of Prosthesis	**All Metal**	**4(15.4%)**	**0(0%)**	**0.874**	**0.646,NS**
	All Ceramic	**5(19.2%)**	**1(3.8%)**		
	PFM	**13(50%)**	**3(11.5%)**		
Unpleasant Odor from Prosthesis	**All Metal**	**3 (11.5%)**	**1(3.8%)**	**1.303**	**0.521,NS**
	All Ceramic	**5(19.2%)**	**1(3.8%)**		
	PFM	**15(57.7%)**	**1(3.8%)**		

Graph 2: Bridges – Discomfort by Material

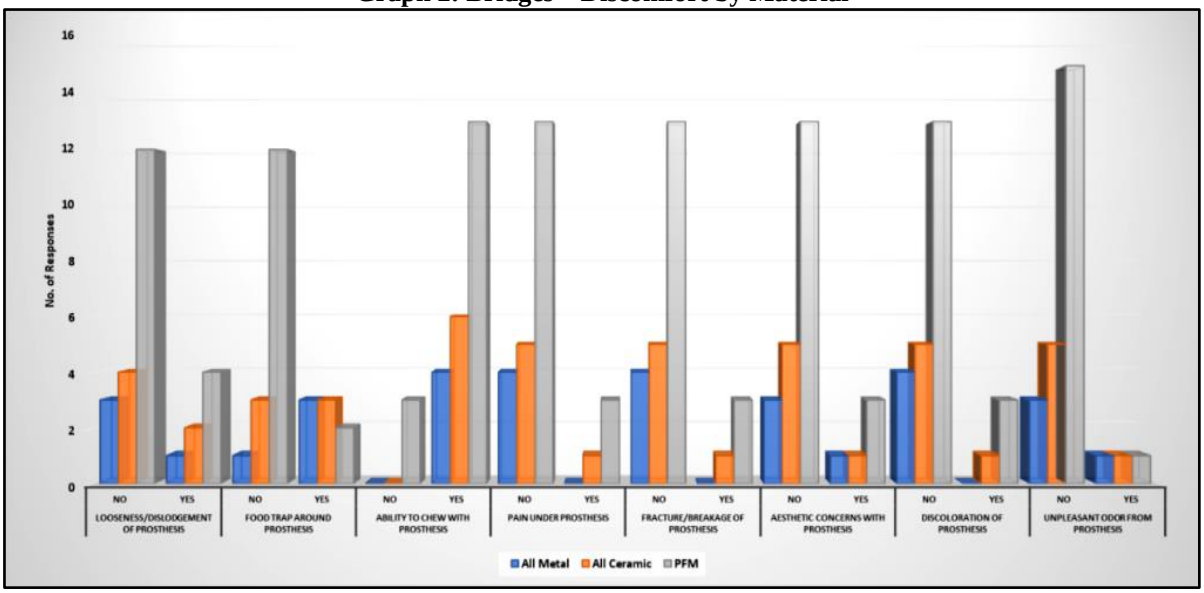
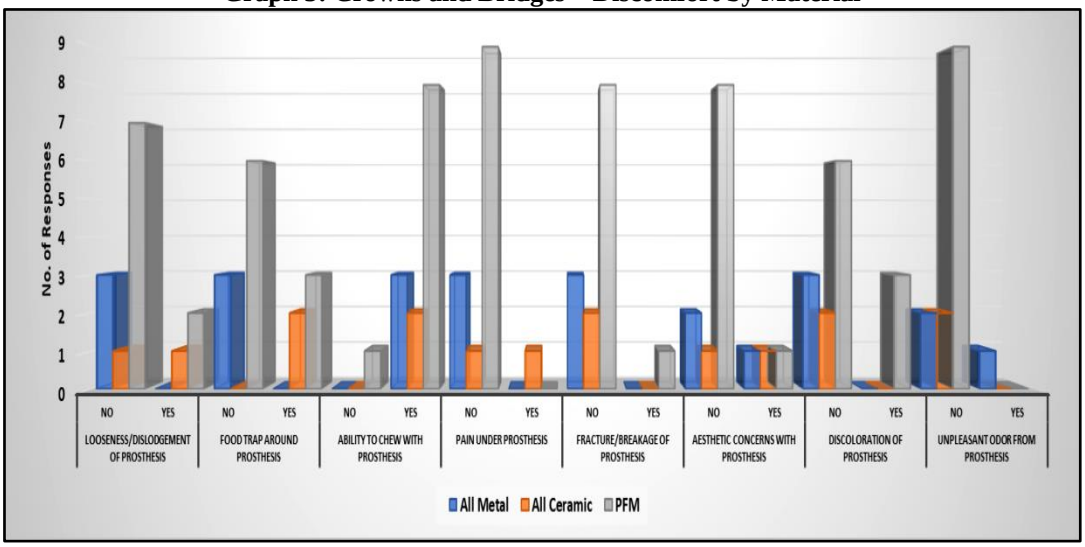


Table 3: Assessment of Specific Factors Contributing to Postoperative Discomfort in Patients with both Crowns and Bridges

FACTORS	Material of Prosthesis	No	Yes	Chi-square value	*p-value,* S/NS
Looseness/Dislodgement of Prosthesis	**All Metal**	**3(21.4%)**	**0(0%)**	**1.791**	**0.408,NS**
	All Ceramic	**1(7.1%)**	**1(7.1%)**		
	PFM	**7(50%)**	**2(14.3%)**		
Food Trap Around Prosthesis	**All Metal**	**3(21.4%)**	**0(0%)**	**5.289**	**0.071,NS**
	All Ceramic	**0(0%)**	**2(14.3%)**		
	PFM	**6(42.9%)**	**3 (21.4%)**		
Ability to Chew with Prosthesis	**All Metal**	**0(0%)**	**3 (21.4%)**	**0.598**	**0.741,NS**
	All Ceramic	**0(0%)**	**2(14.3%)**		
	PFM	**1(7.1%)**	**8(57.1%)**		
Pain Under Prosthesis	**All Metal**	**3(21.4%)**	**0(0%)**	**6.462**	**0.040,S**
	All Ceramic	**1(7.1%)**	**1(7.1%)**		
	PFM	**9(64.3%)**	**0(0%)**		
Fracture/Breakage of Prosthesis	**All Metal**	**3(21.4%)**	**0(0%)**	**0.598**	**0.741,NS**
	All Ceramic	**2(14.3%)**	**0(0%)**		
	PFM	**8(57.1%)**	**1(7.1%)**		
Esthetic Concerns with Prosthesis	**All Metal**	**2(14.3%)**	**1(7.1%)**	**1.791**	**0.408,NS**
	All Ceramic	**1(7.1%)**	**1(7.1%)**		
	PFM	**8(57.1%)**	**1(7.1%)**		
Discolouration of Prosthesis	**All Metal**	**3(21.4%)**	**0(0%)**	**2.121**	**0.346,NS**
	All Ceramic	**2(14.3%)**	**0(0%)**		
	PFM	**6(42.9%)**	**3 (21.4%)**		
Unpleasant Odor from	**All Metal**	**2(14.3%)**	**1(7.1%)**	**3.949**	**0.139,NS**

Prosthesis	**All Ceramic**	**2(14.3%)**	**0(0%)**		
	PFM	**9(64.3%)**	**0(0%)**		

Graph 3: Crowns and Bridges – Discomfort by Material



DISCUSSION

The present study underscores the multifactorial nature of postoperative discomfort in patients rehabilitated with fixed prosthodontic restorations. Chewing difficulty and food impaction emerged as the most frequently reported complaints, particularly among ceramic and PFM restorations. The higher frequency of chewing difficulty in PFM and all ceramic groups may be attributed to connector design, occlusal discrepancies and brittleness of veneering ceramics under functional load. Importantly, food impaction in bridges showed a statistically significant association *($p = 0.027$)* reinforcing the role of pontic contour, tissue adaptation and embrasure form in patient comfort.[3,4,12] Pain under the prosthesis, though less commonly reported demonstrated a significant association in combined restorations *($p = 0.040$)*. This could be related to cumulative occlusal loading, marginal leakage or biomechanical strain distributed across multiple units. Such outcomes align with previous observations.[13] Esthetic concerns and discolouration were more common with ceramics and PFM, likely due to veneer chipping, surface roughness and marginal staining. Conversely, all metal restorations showed fewer esthetic issues, no discolouration and fewer odors, supporting their superior functional reliability despite their limited acceptance in visible zones. Odor complaints predominantly associated with PFM restorations may reflect rough internal surfaces and hygiene challenges at the metal-ceramic junctions.[14,2] These observations highlight that while material selection is important, it is not sufficient alone to predict patient comfort. Prosthesis design, occlusal balance, pontic contour and hygiene accessibility are also critical factors influencing outcomes. The importance of laboratory precision, dentist-technician communication and accurate impression making has also been emphasised in prior work.[15] The present study is limited by its cross-sectional design and reliance on self-reported outcomes which may be influenced by subjective perceptions and recall bias. The modest sample size and single-centre setting may restrict generalizability. In addition, the variability in follow-up period and lack of uniform control over factors such as cement type, prosthesis age and occlusal adjustment protocol may have introduced confounding influences. Future research should focus on larger, multi-centre longitudinal studies that integrate both objective clinical parameters such as probing depth, occlusal analysis and radiographic findings with patient-reported outcomes.

CONCLUSION

The present study assessed postoperative discomfort in patients rehabilitated with crowns and fixed partial dentures (FPDs) through a structured questionnaire. From the present study the following conclusions are drawn:

In patients with single crown restorations, the most frequently reported complication was difficulty in chewing with the highest incidence in all ceramic crowns (44.4%), followed by PFM (33.3%) and lowest in all metal crowns (16.7%). Discolouration was also most prevalent in all ceramic prostheses (44.4%) whereas all metal crowns showed no such complaints indicating superior colour stability. Food lodgement and esthetic dissatisfaction were more frequently noted in ceramic and PFM crowns compared to metal crowns. In patients with fixed partial dentures (Bridges), chewing difficulty was again the most common complaint, particularly in PFM bridges (50%) followed by all ceramic (23.1%) and all metal (15.4%). Importantly, food impaction was significantly associated with prosthesis material being more frequent in all metal and all ceramic

bridges (11.5% each) highlighting the role of pontic design and adaptation. Other complications such as pain, fracture, odor and esthetic concerns were more frequently seen in PFM bridges. These results indicate that while PFM bridges provide strength, their design and hygiene limitations contribute to patient-reported discomfort. Patients with both crowns and bridges showed complex discomfort patterns with chewing difficulty most common in PFM (57.1%). Pain under the prosthesis was significantly associated with all metal (21.4%) and all ceramic (14.3%) restorations while PFM showed higher rates of discolouration (21.4%) and unpleasant odor (64.3%). The findings reveal that postoperative discomfort is multifactorial, influenced by the type, material, design and patient-specific factors of the prosthesis.

Clinical Significance

This study emphasizes the importance of patient-reported outcomes in evaluating the success of fixed prosthodontic restorations. While all ceramic crowns showed the highest chewing difficulty and discolouration (44.4%); PFM bridges were associated with more chewing complaints (50%) and unpleasant odor (64.3%) and all metal restorations had fewer complications but limited esthetics. These findings highlight that patient comfort depends more on prosthesis design, occlusal balance and hygiene maintenance than on material choice alone. Incorporating patient perspectives can guide better material selection, pontic design and patient education, ultimately enhancing long-term clinical success and satisfaction.

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