Research Article

Comparative Evaluation Of Periodontal And Peri- Implant Health Around Implant-Supported Versus Tooth-Supported Fixed Dental Prosthesis

Dr. Pragya Singh[1], Dr. Saloni Deol[2], Dr. Karanveer Singh[3], Dr. Tania Goutam[4]*, Dr. Puneet Sharma[5], Dr. Nikita Chaudhary[6], Dr. Shishpal[7]

[1] Assistant Professor, Department of Periodontology & Oral Implantology, Shree Bankey Bihari Dental College & Research Centre, Ghaziabad, Uttar Pradesh, India.
Email: pragyas24@gmail.com
[2] Reader, Department of Prosthodontics and Crown & Bridge, National Dental College and Hospital, Dera Bassi, Mohali, Punjab, India.
Email: salonideol123@gmail.com
[3] Professor, Department of Prosthodontics and Crown & Bridge, Swami Devi Dyal Hospital & Dental College, Barwala, Panchkula, Haryana, India.
Email: dockaranveer@gmail.com
[4] Senior Resident, Department of Periodontics, Indira Gandhi Government Dental College & Hospital, Jammu, Jammu & Kashmir, India.
Email: taniagoutam9@gmail.com
[5] Professor, Department of Periodontology & Oral Implantology, Surendera Dental College & Research Institute, Sri Ganganagar, Rajasthan, India.
Email: puneet.sharma206@gmail.com
[6] Dental Consultant, Darshan Dental Oral Cancer Diagnostic & Treatment Center, Bhiwani, Haryana, India.
Email: nikitachaudhary248@gmail.com
[7]PG Student, Department of Oral Pathology & Microbiology, Maharaja Ganga Singh Dental College & Research Centre, Sri Ganganagar, Rajasthan, India.
Email- shishpal911@gmail.com
Corresponding Author:
Dr. Tania Goutam
Senior Resident, Department of Periodontics, Indira Gandhi Government Dental College & Hospital, Jammu, Jammu & Kashmir, India.
Email: taniagoutam9@gmail.com

Abstract

Background: Long-term success of fixed prosthetic rehabilitation depends on prosthesis survival and maintenance of healthy periodontal and peri-implant tissues. Differences in supporting structures, prosthetic contours, plaque retention, and oral-hygiene accessibility may influence tissue response around implant-supported and tooth-supported fixed prostheses.
Aim: To compare the periodontal and peri-implant status around implant-supported and tooth-supported fixed prostheses in patients at a tertiary care hospital.
Materials and Methods: This hospital-based comparative observational study included 36 patients, divided equally into Group I with implant-supported fixed prostheses and Group II with tooth-supported fixed prostheses. Clinical assessment included plaque index, bleeding on probing, probing pocket depth, gingival/peri-implant mucosal recession, inflammation, suppuration, swelling or tenderness, and mobility. Prosthesis-related variables such as food impaction, marginal adaptation, oral-hygiene accessibility, and prosthetic contour were recorded. Marginal bone status was assessed radiographically. Data were analysed using IBM SPSS Statistics version 27.0, and $p<0.05$ was considered statistically significant.
Results: Mean age was 46.78 ± 9.42 years in Group I and 48.61 ± 10.06 years in Group II (p=0.583). Implant-supported prostheses showed significantly lower plaque index (0.82 ± 0.31 vs 1.12 ± 0.36; p=0.011), bleeding on probing (21.70 ± 10.80% vs 34.60 ± 13.40%; p=0.003), probing pocket depth (2.74 ± 0.42 vs 3.18 ± 0.51 mm; p=0.008), recession (0.61 ± 0.29 vs 0.84 ± 0.36 mm; p=0.042), and marginal bone loss (0.78 ± 0.32 vs 1.08 ± 0.41 mm; p=0.020). Clinically evident inflammation was less frequent in Group I (22.22% vs 61.11%; p=0.041), as was food impaction (16.67% vs 55.56%; p=0.035). Marginal bone loss ≤1.00 mm was observed in 72.22% of Group I and 27.78% of Group II (p=0.026).
Conclusion: Implant-supported fixed prostheses were associated with more favorable periodontal and peri-implant tissue conditions than tooth-supported fixed prostheses. Careful prosthetic design, effective plaque control, and regular maintenance remain essential for preserving supporting tissue health**.**.

Keywords: Implant-supported prosthesis; Tooth-supported prosthesis; Periodontal status; Peri-implant health; Marginal bone loss.

Introduction

Replacement of missing teeth with a fixed prosthesis is a fundamental component of contemporary prosthodontic care because it restores mastication, appearance, speech and occlusal stability. Fixed prosthetic rehabilitation may be supported by natural teeth or by osseointegrated dental implants, and both approaches are widely used for partially edentulous patients. Tooth-supported fixed prostheses depend on prepared abutment teeth and their

periodontal supporting apparatus, whereas implant-supported prostheses transmit functional forces through the implant–bone interface. Because these two supporting systems differ biologically and biomechanically, their long-term success cannot be judged only by prosthesis retention or survival; the condition of the surrounding periodontal and peri-implant tissues is equally important.[1] The periodontium surrounding a natural abutment tooth consists of gingiva, periodontal ligament, cementum and alveolar bone. Preservation of these tissues is essential for the continued function of a tooth-supported fixed prosthesis. Prosthetic margins, emergence contour and accessibility for oral hygiene may influence plaque retention and the inflammatory condition of the gingiva. When plaque control becomes difficult around a fixed prosthesis, gingival inflammation, bleeding on probing, increased probing depth, attachment loss, recession and alveolar bone changes may develop. Therefore, evaluation of tooth-supported prostheses should include both the technical quality of the restoration and objective assessment of periodontal parameters around the abutment teeth.[2] Implant-supported fixed prostheses eliminate the need to prepare adjacent natural teeth and provide direct support from osseointegrated implants. However, peri-implant tissues differ structurally from periodontal tissues around natural teeth and remain vulnerable to plaque-associated inflammatory changes. The contours of an implant restoration, its emergence angle and profile, position within a splinted prosthesis, and the relationship between the crown and implant can influence the local environment. These prosthetic features may affect cleansability, biofilm accumulation and access for professional maintenance, making prosthetic design an important component of peri-implant tissue assessment rather than merely an esthetic or mechanical consideration.[3] Clinical monitoring around implant-supported restorations commonly includes plaque accumulation, bleeding on probing, probing pocket depth, mucosal recession, suppuration and radiographic marginal bone levels. These parameters provide complementary information regarding the inflammatory and structural condition of peri-implant tissues. The mode of prosthesis retention and abutment design may also alter the peri-implant environment by affecting emergence form, tissue access and the possibility of residual luting material. Accordingly, evaluation of an implant-supported prosthesis requires integration of clinical soft-tissue findings with radiographic bone assessment and inspection of the restoration itself. A mechanically stable prosthesis may still be associated with biological complications requiring early identification.[4] The emergence profile is particularly relevant where the implant restoration passes through the peri-implant mucosa. A restoration must transition from the narrower implant or abutment platform to the wider anatomical form of the definitive crown while maintaining tissue support and allowing plaque removal. Excessive convexity or an unsuitable emergence form can compromise oral-hygiene access and create a local environment favourable to plaque accumulation. At the same time, an appropriately designed transmucosal contour is required to support soft-tissue architecture and esthetics. These considerations have increased interest in evaluating emergence characteristics together with peri-implant soft-tissue health and marginal bone stability.[5] Plaque control is central to both periodontal and peri-implant health. Prosthetic contours that limit interdental cleaning, poorly accessible proximal areas, food-retentive spaces and unfavourable subgingival or submucosal extensions may interfere with daily hygiene. Around implants, the relationship between crown emergence characteristics, plaque and soft-tissue inflammation is clinically important, while around tooth-supported prostheses, restoration-related plaque retention may affect the periodontal condition of abutment teeth. Thus, prosthesis design and oral-hygiene accessibility should be considered together when interpreting bleeding on probing, probing depth, recession and other inflammatory findings.[6]

Materials and Methods

This hospital-based comparative observational study was conducted at a tertiary care hospital to evaluate and compare the periodontal and peri-implant tissue status around implant-supported and tooth-supported fixed prostheses. A total of 36 patients rehabilitated with fixed prostheses were enrolled after clinical screening according to predefined eligibility criteria. The participants were divided into two groups: Group I consisted of 18 patients with implant-supported fixed prostheses, while Group II consisted of 18 patients with tooth-supported fixed prostheses. The study was conducted in accordance with ethical principles for biomedical research. Approval was obtained from the Institutional Ethics Committee, and written informed consent was obtained from all participants before clinical examination.

Eligibility Criteria

Patients of either sex who had a functioning implant-supported or tooth-supported fixed prosthesis and were willing

to participate were considered eligible. Patients were required to have clinically stable prostheses that permitted periodontal or peri-implant examination. Patients with uncontrolled systemic diseases that could significantly influence periodontal health, such as uncontrolled diabetes mellitus, immunocompromising conditions, or severe systemic illness, were excluded. Patients receiving medications known to markedly affect periodontal tissues, those undergoing active periodontal therapy, pregnant or lactating women, patients with untreated generalized periodontitis, and those with poor compliance for clinical examination were excluded. Patients with mobile or fractured prostheses, failed implants, or prostheses requiring immediate replacement were also excluded to avoid interference with periodontal measurements.

Methodology

Clinical Examination and Periodontal Parameters: All participants underwent a detailed oral and prosthetic examination under adequate illumination using a mouth mirror and a calibrated periodontal probe. Clinical measurements were recorded systematically around the abutment teeth or implants supporting the fixed prosthesis. Plaque accumulation was assessed using the Plaque Index to determine the level of oral hygiene around the prosthetic restoration. Gingival or peri-implant mucosal inflammation was assessed clinically by evaluating changes in colour, contour, consistency, and inflammatory response of the surrounding soft tissues. Bleeding on probing (BOP) was recorded as present or absent after gentle probing and was expressed as the percentage of examined sites showing bleeding.

Probing pocket depth (PPD) was measured in millimetres from the gingival or mucosal margin to the base of the sulcus or pocket using gentle probing force. Measurements were recorded at six sites—mesiobuccal, mid-buccal, distobuccal, mesiolingual/palatal, mid-lingual/palatal, and distolingual/palatal—around each selected abutment tooth or implant. Gingival recession around tooth-supported prostheses and peri-implant mucosal recession around implant-supported prostheses were measured as the distance between the reference margin and the free gingival or mucosal margin. Clinical attachment level (CAL) was assessed around natural abutment teeth wherever applicable. The presence of suppuration, mucosal swelling, tenderness, abnormal mobility, and other clinical signs suggestive of periodontal or peri-implant disease was also recorded.

Prosthesis-Related and Radiographic Assessment: Relevant prosthesis-related characteristics, including type of supporting unit, prosthesis location in the maxillary or mandibular arch, anterior or posterior location, number of prosthetic units, marginal adaptation, accessibility for oral hygiene, and presence of food impaction, were recorded. The contours of the prosthesis and the relationship of the prosthetic margins to the surrounding soft tissues were clinically evaluated. Where clinically indicated and available, standardized intraoral periapical radiographs were used to evaluate marginal bone levels adjacent to the implant or tooth abutment. Crestal bone changes, angular bone loss, and other radiographic abnormalities were documented. Implant mobility was assessed clinically, whereas tooth mobility was graded when present. All clinical evaluations were performed according to a standardized examination protocol to minimize inter-observation variability.

Outcome Measures and Group Comparison: The primary outcome variables included plaque index, bleeding on probing, probing pocket depth, gingival/peri-implant mucosal recession, and marginal bone status. Secondary parameters included gingival or mucosal inflammation, suppuration, tooth or implant mobility, food impaction, prosthetic marginal adaptation, and oral-hygiene accessibility. Mean values of the clinical parameters were calculated for each participant and subsequently compared between the implant-supported and tooth-supported fixed prosthesis groups. Periodontal and peri-implant conditions were also categorized according to the presence or absence of clinically evident inflammation and pathological tissue changes.

Statistical Analysis

The collected data were entered into Microsoft Excel and analysed using IBM SPSS Statistics version 27.0. Continuous variables were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. Normality of continuous variables was assessed using the Shapiro–Wilk test. The independent-samples t-test was used to compare normally distributed continuous variables between the two groups, whereas

the Mann–Whitney U test was used for non-normally distributed data. Categorical variables were compared using the Chi-square test or Fisher's exact test, as appropriate. A p-value <0.05 was considered statistically significant.

Results

Table 1. Demographic and Prosthesis-Related Characteristics of the Study Participants

A total of 36 patients were included in the study, with 18 patients each in the implant-supported fixed prosthesis group (Group I) and the tooth-supported fixed prosthesis group (Group II). The mean age of patients in Group I was 46.78 ± 9.42 years, while that of patients in Group II was 48.61 ± 10.06 years. The difference in mean age between the two groups was not statistically significant (p=0.583).

Regarding sex distribution, Group I comprised 10 males (55.56%) and 8 females (44.44%), whereas Group II included 9 males (50.00%) and 9 females (50.00%). No statistically significant difference was observed in sex distribution between the two groups (p=1.000). With respect to the dental arch involved, 11 patients (61.11%) in Group I and 10 patients (55.56%) in Group II had prostheses in the maxilla, while mandibular prostheses were present in 7 patients (38.89%) and 8 patients (44.44%), respectively. The difference in arch distribution was not statistically significant (p=1.000).

In terms of prosthesis location, posterior prostheses were more common in both groups. In Group I, 13 patients (72.22%) had posterior prostheses and 5 (27.78%) had anterior prostheses. In Group II, 12 patients (66.67%) had posterior prostheses and 6 (33.33%) had anterior prostheses. No statistically significant difference in prosthesis location was observed between the groups (p=1.000). Regarding the number of prosthetic units, 3-unit prostheses were the most frequently observed, accounting for 10 patients (55.56%) in Group I and 11 patients (61.11%) in Group II. Two-unit prostheses were present in 4 patients (22.22%) in Group I and 3 patients (16.67%) in Group II, while prostheses involving four or more units were present in 4 patients (22.22%) in each group. The distribution of the number of prosthetic units was comparable between the two groups (p=0.909).

Table 2. Comparison of Periodontal and Peri-Implant Clinical Parameters Between the Two Groups

The mean Plaque Index was 0.82 ± 0.31 in the implant-supported group compared with 1.12 ± 0.36 in the tooth-supported group. The difference was statistically significant (p=0.011), with a higher mean Plaque Index recorded in Group II. The mean percentage of bleeding on probing was 21.70 ± 10.80% in Group I and 34.60 ± 13.40% in Group II. This difference was also statistically significant (p=0.003).

The mean probing pocket depth was 2.74 ± 0.42 mm among patients with implant-supported prostheses and 3.18 ± 0.51 mm among those with tooth-supported prostheses. The difference of approximately 0.44 mm between the groups was statistically significant (p=0.008). Similarly, the mean gingival/peri-implant mucosal recession was 0.61 ± 0.29 mm in Group I and 0.84 ± 0.36 mm in Group II, with the difference reaching statistical significance (p=0.042). Radiographic measurement of marginal bone loss showed a mean value of 0.78 ± 0.32 mm in the implant-supported group compared with 1.08 ± 0.41 mm in the tooth-supported group. The difference was statistically significant (p=0.020). Thus, all five assessed periodontal and peri-implant clinical parameters demonstrated statistically significant differences between the two groups, with higher mean values recorded in the tooth-supported prosthesis group.

Table 3. Distribution of Clinical Signs of Periodontal/Peri-Implant Inflammation

Clinically evident inflammation was identified in 4 patients (22.22%) in the implant-supported group compared with 11 patients (61.11%) in the tooth-supported group. Conversely, absence of clinically evident inflammation was recorded in 14 patients (77.78%) in Group I and 7 patients (38.89%) in Group II. The difference in the occurrence of clinically evident inflammation between the two groups was statistically significant (p=0.041).

Suppuration was observed in only 1 patient (5.56%) in Group I compared with 4 patients (22.22%) in Group II. Absence of suppuration was recorded in 17 patients (94.44%) in Group I and 14 patients (77.78%) in Group II. However, the difference was not statistically significant (p=0.338).

Clinical swelling or tenderness was detected in 2 patients (11.11%) with implant-supported prostheses and 6 patients (33.33%) with tooth-supported prostheses. The majority of participants did not exhibit swelling or tenderness, including 16 patients (88.89%) in Group I and 12 patients (66.67%) in Group II. The between-group difference was

not statistically significant (p=0.228).
No implant mobility was detected in Group I, with all 18 patients (100.00%) demonstrating absence of mobility. In contrast, 3 patients (16.67%) in Group II exhibited tooth mobility, while 15 patients (83.33%) had no mobility. The difference between the groups did not reach statistical significance (p=0.229).

Table 4. Comparison of Prosthesis-Related Clinical Findings Between the Two Groups
Food impaction was recorded in 3 patients (16.67%) in the implant-supported prosthesis group and 10 patients (55.56%) in the tooth-supported prosthesis group. Food impaction was absent in 15 patients (83.33%) in Group I compared with 8 patients (44.44%) in Group II. The difference between the two groups was statistically significant (p=0.035).
Poor marginal adaptation was observed in 2 patients (11.11%) in Group I and 7 patients (38.89%) in Group II. In comparison, satisfactory marginal adaptation was noted in 16 patients (88.89%) in Group I and 11 patients (61.11%) in Group II. Although poor marginal adaptation was numerically more frequent in the tooth-supported group, the difference did not reach statistical significance (p=0.121).
Limited accessibility for oral hygiene was found in 4 patients (22.22%) in the implant-supported group compared with 10 patients (55.56%) in the tooth-supported group. Adequate oral-hygiene accessibility was noted in 14 patients (77.78%) and 8 patients (44.44%), respectively. The difference was not statistically significant (p=0.086).
An unfavourable or overcontoured prosthetic contour was identified in 3 patients (16.67%) in Group I and 8 patients (44.44%) in Group II. An acceptable prosthetic contour was observed in 15 patients (83.33%) in Group I and 10 patients (55.56%) in Group II. The difference was not statistically significant (p=0.146).

Table 5. Radiographic Marginal Bone Status Around Implant- and Tooth-Supported Prostheses
Radiographic assessment demonstrated differences in the distribution of marginal bone loss between the two groups. Marginal bone loss of ≤1.00 mm was recorded in 13 patients (72.22%) in the implant-supported group compared with 5 patients (27.78%) in the tooth-supported group. Marginal bone loss of >1.00–2.00 mm was observed in 4 patients (22.22%) in Group I and 9 patients (50.00%) in Group II.
Marginal bone loss exceeding 2.00 mm was detected in 1 patient (5.56%) with an implant-supported prosthesis compared with 4 patients (22.22%) with a tooth-supported prosthesis. Overall, 72.22% of patients in the implant-supported group had marginal bone loss limited to ≤1.00 mm, whereas 72.22% of the tooth-supported group had marginal bone loss greater than 1.00 mm. The overall distribution of marginal bone loss between the two study groups was statistically significant (p=0.026).

Table 1. Demographic and Prosthesis-Related Characteristics of the Study Participants

Variable	**Group I: Implant-Supported Prosthesis (n=18)**	**Group II: Tooth-Supported Prosthesis (n=18)**	**P value**
Age (years), Mean ± SD	46.78 ± 9.42	48.61 ± 10.06	0.583
Sex			1.000
Male	10 (55.56%)	9 (50.00%)	
Female	8 (44.44%)	9 (50.00%)	
Arch			1.000
Maxilla	11 (61.11%)	10 (55.56%)	
Mandible	7 (38.89%)	8 (44.44%)	
Prosthesis location			1.000
Anterior	5 (27.78%)	6 (33.33%)	
Posterior	13 (72.22%)	12 (66.67%)	
Number of prosthetic units			0.909
2 units	4 (22.22%)	3 (16.67%)	
3 units	10 (55.56%)	11 (61.11%)	
≥4 units	4 (22.22%)	4 (22.22%)	

Table 2. Comparison of Periodontal and Peri-Implant Clinical Parameters Between the Two Groups

Clinical Parameter	Group I: Implant-Supported (n=18), Mean ± SD	Group II: Tooth-Supported (n=18), Mean ± SD	P value
Plaque Index	0.82 ± 0.31	1.12 ± 0.36	**0.011***
Bleeding on probing (%)	21.70 ± 10.80	34.60 ± 13.40	**0.003***
Probing pocket depth (mm)	2.74 ± 0.42	3.18 ± 0.51	**0.008***
Gingival/peri-implant mucosal recession (mm)	0.61 ± 0.29	0.84 ± 0.36	**0.042***
Marginal bone loss (mm)	0.78 ± 0.32	1.08 ± 0.41	**0.020***

*Statistically significant at p<0.05.

Table 3. Distribution of Clinical Signs of Periodontal/Peri-Implant Inflammation

Clinical Finding	Group I: Implant-Supported (n=18)	Group II: Tooth-Supported (n=18)	P value
Clinically evident inflammation	4 (22.22%)	11 (61.11%)	**0.041***
No clinically evident inflammation	14 (77.78%)	7 (38.89%)	
Suppuration	1 (5.56%)	4 (22.22%)	0.338
No suppuration	17 (94.44%)	14 (77.78%)	
Swelling/tenderness	2 (11.11%)	6 (33.33%)	0.228
No swelling/tenderness	16 (88.89%)	12 (66.67%)	
Tooth/implant mobility	0 (0.00%)	3 (16.67%)	0.229
No mobility	18 (100.00%)	15 (83.33%)	

*Statistically significant at p<0.05.

Table 4. Comparison of Prosthesis-Related Clinical Findings Between the Two Groups

Prosthesis-Related Finding	Group I: Implant-Supported (n=18)	Group II: Tooth-Supported (n=18)	P value
Food impaction present	3 (16.67%)	10 (55.56%)	**0.035***
Food impaction absent	15 (83.33%)	8 (44.44%)	
Poor marginal adaptation	2 (11.11%)	7 (38.89%)	0.121
Satisfactory marginal adaptation	16 (88.89%)	11 (61.11%)	
Limited accessibility for oral hygiene	4 (22.22%)	10 (55.56%)	0.086
Adequate accessibility for oral hygiene	14 (77.78%)	8 (44.44%)	
Unfavourable/overcontoured prosthetic contour	3 (16.67%)	8 (44.44%)	0.146
Acceptable prosthetic contour	15 (83.33%)	10 (55.56%)	

*Statistically significant at p<0.05.

Table 5. Radiographic Marginal Bone Status Around Implant- and Tooth-Supported Prostheses

Marginal Bone Loss	Group I: Implant-Supported (n=18)	Group II: Tooth-Supported (n=18)	P value
≤1.00 mm	13 (72.22%)	5 (27.78%)	**0.026***
>1.00–2.00 mm	4 (22.22%)	9 (50.00%)	

>2.00 mm	1 (5.56%)	4 (22.22%)	
Total	**18 (100.00%)**	**18 (100.00%)**	

*Statistically significant at p<0.05.

Discussion

The demographic and prosthesis-related characteristics of the two groups were largely comparable in the present study. The mean age was 46.78 ± 9.42 years in the implant-supported group and 48.61 ± 10.06 years in the tooth-supported group, with no significant difference (p=0.583). Similarly, sex, arch distribution, prosthesis location and number of prosthetic units did not differ significantly between the groups. Posterior prostheses predominated in both groups, accounting for 72.22% of implant-supported and 66.67% of tooth-supported prostheses. Ko et al. (2024) evaluated 26 patients with posterior implant-supported single crowns and reported a mean age of 48.9 ± 6.95 years, which is close to the age distribution observed in the present study. Their investigation specifically involved posterior implant-supported restorations, whereas posterior restorations also constituted the majority of prostheses in the present sample. Thus, the comparable demographic distribution between the two current groups reduces the likelihood that differences in periodontal findings were simply related to age or prosthesis location.[7] In the present study, the Plaque Index was significantly lower around implant-supported prostheses (0.82 ± 0.31) than around tooth-supported prostheses (1.12 ± 0.36; p=0.011). Bleeding on probing showed a similar pattern, with values of 21.70 ± 10.80% and 34.60 ± 13.40%, respectively (p=0.003). Abreu et al. (2007) reported mean plaque scores of 0.82 ± 0.13 around implants and 0.90 ± 0.07 around teeth, without a significant difference (p=0.54). However, they observed bleeding on probing at 50.9% of implant sites compared with 25.1% of tooth sites (p=0.0001). Therefore, although the plaque score around implants in their study was numerically lower, as in the present investigation, their BOP findings showed the opposite pattern. Differences in maintenance practices, prosthesis configuration, baseline periodontal status and the method of site-level versus patient-level assessment could contribute to this variation between studies.[8] The mean probing pocket depth in the present study was 2.74 ± 0.42 mm around implant-supported prostheses and 3.18 ± 0.51 mm around tooth-supported prostheses (p=0.008). Gingival/peri-implant mucosal recession was also significantly lower in the implant group (0.61 ± 0.29 mm) than in the tooth-supported group (0.84 ± 0.36 mm; p=0.042). Pathak et al. (2016) prospectively evaluated periodontal parameters around implants and adjacent natural teeth and, at 12 months, reported a mean PPD of approximately 2.37 mm around implants, compared with 2.12 mm at mesial control teeth and approximately 2.01 mm at distal control teeth. Their PPD findings therefore showed slightly greater probing depth around implants, in contrast to the present study, where probing depth was greater around tooth-supported prostheses. Pathak et al. also demonstrated progressive reduction in plaque, bleeding, probing depth and recession parameters during follow-up, emphasizing that these clinical measurements can vary substantially according to oral hygiene and periodontal maintenance.[9] Radiographically, the present study recorded significantly less mean marginal bone loss around implant-supported prostheses (0.78 ± 0.32 mm) than around tooth-supported prostheses (1.08 ± 0.41 mm; p=0.020). Agliardi et al. (2010), in their clinical study of immediately loaded fixed prostheses supported by axial and tilted implants, reported an average peri-implant marginal bone loss of 0.85 mm, with values of approximately 0.80 mm around tilted implants and 0.90 mm around axial implants after 12 months. The overall peri-implant bone-loss value reported by Agliardi et al. is therefore very close to the 0.78 mm mean observed around implants in the present study. Although their study involved full-arch implant-supported prostheses and did not directly compare these with tooth-supported prostheses, the similarity in the magnitude of peri-implant marginal bone loss provides useful support for the relatively limited radiographic bone loss recorded around implants in the present sample.[10] Clinical evidence of inflammation was observed in 22.22% of patients with implant-supported prostheses compared with 61.11% of those with tooth-supported prostheses, and this difference was statistically significant (p=0.041). Suppuration (5.56% vs 22.22%), swelling/tenderness (11.11% vs 33.33%) and mobility (0.00% vs 16.67%) were also numerically less frequent in the implant-supported group, although these differences were not statistically significant. Gunpinar et al. (2020) examined 382 patients with 1,415 implants and found healthy peri-implant tissues in 22.0% of patients, peri-implant mucositis in 41.1%, and peri-implantitis in 36.9%. At implant level, mucositis and peri-implantitis were present in 53.6% and 21.7%, respectively; the mean PPD was 3.54 ± 1.53 mm and mean BOP was 50.49%. These values indicate a considerably greater burden of peri-implant inflammatory findings than that

observed in the implant group of the present study, where clinical inflammation was 22.22%, mean PPD was 2.74 mm and BOP was 21.70%. Differences in case definitions and population characteristics should, however, be considered when comparing these percentages.[11] Food impaction was one of the most notable prosthesis-related findings in the present study. It was present in only 3 of 18 patients (16.67%) with implant-supported prostheses but in 10 of 18 patients (55.56%) with tooth-supported prostheses, representing a statistically significant difference (p=0.035). Wang et al. (2021) retrospectively evaluated 489 patients, 779 implant restorations and 879 adjacent sites and reported food impaction in 16.6% of patients with implant restorations. Remarkably, this value is almost identical to the 16.67% prevalence recorded in the implant-supported group of the present study. Wang et al. further identified proximal contact-related characteristics as important contributors to food impaction around implant restorations. The considerably higher frequency observed around tooth-supported prostheses in the present investigation suggests that proximal contact, contour and cleansability of fixed prostheses require careful clinical evaluation irrespective of the type of supporting structure.[12] Other prosthesis-related parameters also showed numerically less favourable findings in the tooth-supported group. Poor marginal adaptation occurred in 11.11% of implant-supported versus 38.89% of tooth-supported prostheses (p=0.121), limited oral-hygiene accessibility in 22.22% versus 55.56% (p=0.086), and an unfavourable or overcontoured prosthetic contour in 16.67% versus 44.44% (p=0.146). Although these differences did not attain statistical significance, their clinical pattern is relevant. AlJasser et al. (2021) evaluated 484 dental implants and reported BOP at more than one peri-implant site in 42% and marginal bone loss in 23.76% of implants. Among restorations with good crown status, 52.7% had no plaque accumulation, only 35% demonstrated BOP, and 94% showed no adverse radiographic change; PPD was also significantly lower with good crown status (p<0.0001). These findings support the observed relationship in the present study between more favourable prosthetic characteristics and better surrounding tissue conditions, although the present differences in marginal adaptation, hygiene accessibility and contour individually did not reach statistical significance.[13] The categorical radiographic assessment further demonstrated a significant difference in marginal bone status between the two prosthesis groups (p=0.026). Marginal bone loss of ≤1.00 mm was present in 72.22% of implant-supported cases but only 27.78% of tooth-supported cases. Bone loss of >1.00–2.00 mm occurred in 22.22% versus 50.00%, while loss exceeding 2.00 mm was observed in 5.56% versus 22.22%, respectively. Kohal et al. (2025) prospectively evaluated one-piece zirconia implants supporting three-unit fixed dental prostheses and reported a mean marginal bone loss of 1.89 ± 2.78 mm among the remaining implants at the five-year evaluation. This value is greater than the mean 0.78 ± 0.32 mm recorded for the implant-supported group in the present investigation, in which only 5.56% of participants exhibited bone loss exceeding 2 mm. Differences in implant design, restorative configuration, patient selection and observation period limit direct comparison, but both studies demonstrate the importance of radiographic assessment in evaluating the condition of supporting tissues around fixed implant restorations.[14]

Conclusion

The present study demonstrated that implant-supported fixed prostheses were associated with more favorable periodontal and peri-implant tissue conditions compared with tooth-supported fixed prostheses. Significantly lower plaque accumulation, bleeding on probing, probing pocket depth, soft-tissue recession, and marginal bone loss were observed around implant-supported prostheses. Clinically evident inflammation and food impaction were also less frequent in the implant-supported group. These findings emphasize the importance of appropriate prosthetic design, effective oral hygiene, and regular periodontal maintenance for preserving the health of tissues surrounding fixed prostheses.

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