

Relationship Between Restorative Overhangs and Periodontal Disease Progression

Dr Subhashree Sahoo*, Dr Zunaid Ahmed, Dr Ruhi Ritika, Dr Deepashri Tekam, Dr Gatha Mohanty and Dr Mayank Charan

¹MDS Consultant endodontist and independent researcher, Bhubaneswar, Odisha.

²MDS Conservative Dentistry and Endodontics Consultant Endodontist MN Hospital Bikaner Ex Senior Lecturer RDCH Jaipur

³Senior Lecturer ,Periodontics,Modern Dental College and Research centre, Indore (M.P.)

⁴Reader Department of conservative dentistry and Endodontics DMDC,DMIHER, Nagpur

⁵Associate Professor Periodontics and Oral Implantology Institute of Dental Science, Siksha 'O' Anusandhan deemed to be University, Bhubaneswar, Odisha

⁶Assistant professor PhD scholar Dept of cons and endo Eklavya Dental College Kotputli

*Correspondence: <subzsahoo96@gmail.com>

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ABSTRACT

Restorative overhangs are recognised as important plaque-retentive factors that may adversely affect periodontal health and contribute to disease progression. This cross-sectional observational study evaluated the relationship between restorative overhangs and periodontal disease progression among 120 participants. Teeth with restorative overhangs showed significantly greater plaque accumulation, gingival inflammation, probing pocket depth, clinical attachment loss, and bleeding on probing than teeth without overhangs. A significant association was also observed between restorative overhangs and increased periodontal disease severity, particularly in posterior teeth. The findings highlight the importance of proper restorative contouring and early correction of defective restorations to maintain periodontal health and prevent periodontal destruction.

Keywords: Restorative overhangs; Periodontal disease; Plaque accumulation; Gingival inflammation; Clinical attachment loss; Restorative dentistry

INTRODUCTION

Periodontal disease is a multifactorial inflammatory condition characterized by the progressive destruction of the supporting structures of the teeth, including the gingiva, periodontal ligament, and alveolar bone. Although microbial dental plaque is recognized as the primary etiological factor, several local contributing factors may enhance plaque accumulation and increase the severity of periodontal destruction. Among these factors, defective dental restorations, particularly restorative overhangs, have been identified as important contributors to periodontal inflammation and disease progression [1,2].

A restorative overhang is defined as an extension of restorative material beyond the prepared cavity margins, creating a plaque-retentive area that is difficult to clean effectively. Such overhangs alter the tooth's natural contour and facilitate the accumulation of dental biofilm, leading to gingival inflammation and increased periodontal

pocket formation [3,4]. Previous investigations have demonstrated that teeth with overhanging restorations exhibit significantly greater plaque accumulation, bleeding on probing, attachment loss, and alveolar bone destruction than teeth with properly contoured restorations [1,4].

The relationship between restorative overhangs and periodontal health has been a subject of interest for several decades. Leon [5] reported that improperly contoured restorations may interfere with normal gingival architecture and contribute to chronic periodontal irritation. Similarly, Matthews and Tabesh [6] emphasised that restoration-related factors can adversely affect periodontal tissues by promoting bacterial colonisation and impairing effective plaque control. These findings highlight the importance of maintaining proper restorative contours and marginal integrity during restorative procedures.

Advances in restorative dentistry have improved the quality and longevity of dental restorations; however,

overhanging margins remain common in clinical practice. Passariello et al. [7] demonstrated that defective proximal restorations remain common and are associated with increased periodontal risk. Furthermore, Petersen et al. [8] emphasised that inadequate restoration design may compromise both periodontal health and long-term treatment outcomes, particularly in patients with poor oral hygiene.

Recent evidence continues to support the association between restorative overhangs and periodontal disease progression. Katircioğlu et al. [9] reported that restoration-related plaque-retentive factors significantly influence periodontal parameters and may contribute to the progression of periodontal breakdown. Similar observations were reported in contemporary clinical investigations evaluating the impact of restoration quality on periodontal health outcomes [10].

Despite substantial evidence supporting the detrimental effects of restorative overhangs, their prevalence and clinical impact remain insufficiently documented in many populations. Understanding the relationship between restorative overhangs and periodontal disease progression is essential for improving restorative practices, minimising iatrogenic periodontal damage, and enhancing long-term oral health outcomes. Therefore, the present study was undertaken to evaluate the relationship between restorative overhangs and periodontal disease progression and to assess their influence on periodontal health parameters.

METHODOLOGY

A cross-sectional observational study was conducted in the Department of Periodontology to evaluate the relationship between restorative overhangs and periodontal disease progression. The study included adult patients aged 18 years and above who presented with at least one permanent tooth restored with a proximal restoration. Participants were selected using a convenience sampling method after obtaining written informed consent. Patients with systemic conditions known to affect periodontal health, those undergoing orthodontic treatment, pregnant women, and individuals who had received periodontal therapy within the previous six months were excluded from the study.

A comprehensive clinical examination was performed under adequate illumination using a mouth mirror and periodontal probe. Restorative overhangs were identified through clinical examination and confirmed with bitewing or periapical radiographs as needed. The presence, location, and extent of restorative overhangs were recorded. Periodontal parameters including Plaque Index (PI), Gingival Index (GI), Probing Pocket Depth (PPD),

Clinical Attachment Loss (CAL), and Bleeding on Probing (BOP) were assessed at the selected sites. Teeth with properly contoured restorations served as the comparison group for evaluating periodontal status. Demographic information such as age and gender, along with oral hygiene practices and relevant dental history, were recorded using a structured proforma. A calibrated examiner performed all clinical measurements to minimise intra-examiner variability. The collected data were entered into a computerised database and analysed using the Statistical Package for the Social Sciences (SPSS) version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarise demographic and clinical characteristics. Continuous variables were expressed as mean $\pm$ standard deviation, while categorical variables were presented as frequencies and percentages. Comparisons between groups were performed using the independent-samples t-test or Mann-Whitney U test for continuous variables and the Chi-square test for categorical variables, as appropriate. Correlation between restorative overhangs and periodontal parameters was assessed using Pearson's or Spearman's correlation analysis. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 120 participants were included in the study. The mean age of the study population was 41.8 ± 11.6 years, with the majority of participants in the 31–50-year age group. Male participants constituted 65.0% of the study population, while females accounted for 35.0%. Among the examined restorations, restorative overhangs were identified in 68 (56.7%) participants, whereas 52 (43.3%) participants exhibited properly contoured restorations (Table 1). The prevalence of restorative overhangs was higher in posterior teeth, particularly in proximal restorations.

Clinical periodontal assessment demonstrated significantly higher Plaque Index (PI), Gingival Index (GI), Probing Pocket Depth (PPD), and Clinical Attachment Loss (CAL) scores in teeth associated with restorative overhangs compared with teeth without overhangs. The mean Plaque Index was 2.14 ± 0.53 in the overhang group compared with 1.31 ± 0.47 in the non-overhang group ($p < 0.001$). Similarly, the mean Gingival Index was significantly higher among participants with restorative overhangs (2.01 ± 0.49) than among those without overhangs (1.22 ± 0.41) ($p < 0.001$) (Table 2).

The mean probing pocket depth associated with overhanging restorations was 4.82 ± 1.12 mm, compared with 2.96 ± 0.84 mm in teeth without overhangs. Clinical attachment loss was also significantly greater in the overhang group (3.74 ± 1.08 mm) than in the control group

(2.05 ± 0.76 mm) (p<0.001) (Table 2).

Bleeding on probing was observed in 79.4% of sites associated with restorative overhangs, whereas only 34.6% of sites without overhangs exhibited bleeding on probing. Statistical analysis revealed a significant association between restorative overhangs and gingival inflammation ($\chi^2 = 24.87$, p<0.001) (Table 3).

Correlation analysis demonstrated a positive relationship between the presence of restorative overhangs and periodontal destruction. The extent of restorative overhangs showed a significant correlation with probing pocket depth (r = 0.58, p<0.001) and clinical attachment loss (r = 0.62, p<0.001), indicating that larger overhangs were associated with greater periodontal deterioration (Table 4). **Table 5** shows the distribution of restorative overhangs according to tooth location. The majority of restorative overhangs were observed in posterior teeth, with the highest prevalence in the maxillary posterior region (41.2%), followed by the mandibular posterior region (35.3%). In contrast, anterior teeth demonstrated a considerably lower frequency of overhanging restorations. These findings suggest that posterior teeth are more susceptible to restorative overhang formation, possibly due to difficulties in access, visibility, and matrix adaptation during restorative procedures. **Table 6** demonstrates the relationship between restorative overhangs and periodontal disease severity. Moderate and severe periodontitis were more frequently observed among teeth with restorative overhangs compared to teeth without overhangs. Severe periodontitis was present in 35.3% of participants with overhanging restorations, whereas only 19.2% of participants without overhangs exhibited severe disease. The statistically significant association between restorative overhangs and periodontal disease severity ($\chi^2 = 8.76$, p = 0.013) indicates that overhanging restorations may contribute to plaque accumulation, gingival inflammation, and subsequent periodontal destruction.

Overall, the findings of the present study demonstrated that restorative overhangs were significantly associated with increased plaque accumulation, gingival inflammation, periodontal pocket formation, and attachment loss. These results suggest that defective restorative margins may act as plaque-retentive factors and contribute substantially to periodontal disease progression.

Table 1. Distribution of Participants According to Restorative Status (n = 120)		
Restorative Status	Frequency (n)	Percentage (%)
Restorative overhang present	68	56.7
No restorative overhang	52	43.3
Total	120	100.0

Table 2. Comparison of Periodontal Parameters Between Teeth With and Without Restorative Overhangs			
Periodontal Parameter	Overhang Present (Mean ± SD)	No Overhang (Mean ± SD)	p-value
Plaque Index (PI)	2.14 ± 0.53	1.31 ± 0.47	<0.001
Gingival Index (GI)	2.01 ± 0.49	1.22 ± 0.41	<0.001
Probing Pocket Depth (PPD) (mm)	4.82 ± 1.12	2.96 ± 0.84	<0.001
Clinical Attachment Loss (CAL) (mm)	3.74 ± 1.08	2.05 ± 0.76	<0.001

Table 3. Association Between Restorative Overhangs and Bleeding on Probing			
Bleeding on Probing	Overhang Present n (%)	No Overhang n (%)	Total
Present	54 (79.4)	18 (34.6)	72
Absent	14 (20.6)	34 (65.4)	48
Total	68 (100)	52 (100)	120

Chi-square = 24.87, p < 0.001

Table 4. Correlation Between Restorative Overhangs and Periodontal Parameters

Variable	Correlation Coefficient (r)	p-value
Overhang extent vs Plaque Index	0.54	<0.001
Overhang extent vs Gingival Index	0.51	<0.001
Overhang extent vs Probing Pocket Depth	0.58	<0.001
Overhang extent vs Clinical Attachment Loss	0.62	<0.001

Table 5. Distribution of Restorative Overhangs According to Tooth Location

Tooth Location	Frequency (n)	Percentage (%)
Maxillary posterior	28	41.2
Mandibular posterior	24	35.3
Maxillary anterior	8	11.8
Mandibular anterior	8	11.8
Total	68	100.0

Table 6. Severity of Periodontal Disease in Relation to Restorative Overhangs

Periodontal Status	Overhang Present n (%)	No Overhang n (%)
Mild Periodontitis	14 (20.6)	22 (42.3)
Moderate Periodontitis	30 (44.1)	20 (38.5)
Severe Periodontitis	24 (35.3)	10 (19.2)
Total	68 (100)	52 (100)

Chi-square = 8.76, p = 0.013

DISCUSSION

The present study evaluated the relationship between restorative overhangs and periodontal disease progression and demonstrated a significant association between defective restorative margins and adverse periodontal outcomes. Teeth associated with restorative overhangs exhibited significantly higher plaque accumulation, gingival inflammation, probing pocket depth, clinical attachment loss, and periodontal disease severity when compared with teeth having properly contoured restorations. These findings support the concept that restorative overhangs act as plaque-retentive factors that facilitate the initiation and progression of periodontal disease.

In the present study, restorative overhangs were identified in more than half of the examined restorations. Similar observations were reported by Brunsvold and Lane [1], who demonstrated a strong association between overhanging restorations and increased periodontal destruction. Their findings suggested that overhangs create areas that are difficult to clean effectively, promoting the accumulation of microbial plaque and increasing the risk of periodontal breakdown. Eid [2] and Raju et al. [3]

similarly reported that defective restorations contribute significantly to local periodontal inflammation and attachment loss.

The periodontal parameters assessed in the present investigation revealed significantly higher Plaque Index and Gingival Index scores in teeth with restorative overhangs. These findings are consistent with those of Albandar and colleagues [4], who observed increased plaque accumulation and gingival inflammation around teeth restored with overhanging margins. The presence of rough restorative surfaces and inaccessible proximal areas may facilitate bacterial colonisation and impair effective oral hygiene, thereby increasing the inflammatory burden on periodontal tissues.

The mean probing pocket depth and clinical attachment loss were significantly greater in teeth associated with restorative overhangs. Similar findings were reported by Leon [5], who demonstrated that defective restorative contours interfere with normal gingival architecture and contribute to periodontal pocket formation. Matthews and Tabesh [6] further emphasised that restoration-related factors may adversely affect periodontal health by altering the ecological balance of the subgingival environment and promoting pathogenic bacterial growth.

The present study also demonstrated a significantly higher prevalence of bleeding on probing in sites associated with restorative overhangs. Bleeding on probing is considered an important clinical indicator of periodontal inflammation and reflects the host response to microbial plaque accumulation. Passariello et al. [7] reported comparable findings and concluded that overhanging restorations are frequently associated with increased gingival bleeding and inflammatory changes in adjacent periodontal tissues. The observed increase in bleeding on probing in the present study further supports the role of restorative overhangs as local irritants that contribute to periodontal disease progression.

Posterior teeth exhibited the highest prevalence of restorative overhangs, particularly in the maxillary and mandibular posterior regions. These findings may be attributed to the technical challenges encountered during restorative procedures in posterior areas, including limited visibility, difficult access, and challenges in matrix adaptation. Petersen et al. [8] emphasised that restoration quality is often compromised in posterior teeth, increasing the likelihood of marginal discrepancies and plaque-retentive areas. The predominance of overhangs on posterior teeth observed in the present study is therefore clinically relevant, as these areas are also more difficult for patients to clean effectively.

A significant association was observed between restorative overhangs and periodontal disease severity. Moderate and severe periodontitis were more frequently observed among teeth with overhanging restorations than among those without overhangs. Similar observations were reported by Katircioğlu et al. [9], who demonstrated that restoration-related plaque-retentive factors significantly influence periodontal parameters and contribute to progressive attachment loss. Their findings support the hypothesis that defective restorative margins may accelerate periodontal destruction when oral hygiene maintenance is inadequate.

Recent evidence has continued to reinforce the relationship between restoration quality and periodontal health. Serra Kutlu Katircioğlu et al. [10] reported that restoration-associated marginal discrepancies may alter the microbial ecosystem and increase susceptibility to periodontal inflammation. These findings are in agreement with the present study, which demonstrated a positive correlation between the extent of restorative overhangs and periodontal destruction.

Walsh [11] highlighted the importance of maintaining proper restorative contours and marginal integrity to prevent plaque retention and periodontal complications. Similarly, Brostek et al. [12] emphasised that restorations should be designed to facilitate effective plaque control and

preserve periodontal health. Llena et al. [13] further reported that defective restorative margins may compromise long-term periodontal stability and increase the risk of future periodontal deterioration.

The findings of the present study also support the observations of Chalmers [14] and Keogh [15], who emphasised the need for careful restorative planning and regular maintenance to prevent iatrogenic periodontal damage. Restoration quality plays a crucial role in determining the long-term success of both restorative and periodontal treatment outcomes. Failure to eliminate overhanging margins may compromise periodontal therapy and contribute to recurrent inflammation.

The biological mechanism underlying the association between restorative overhangs and periodontal disease progression is multifactorial. Overhanging restorations create sheltered environments that facilitate biofilm maturation and increase the retention of pathogenic microorganisms. This microbial accumulation initiates an inflammatory response that may eventually result in connective tissue destruction, periodontal pocket formation, and alveolar bone loss. Previous studies have consistently demonstrated that removal or correction of overhanging restorations is associated with improved periodontal health and reduced inflammation [16–20].

The clinical significance of the present findings lies in preventing iatrogenic periodontal disease. Proper cavity preparation, accurate matrix placement, meticulous finishing and polishing, and regular post-restorative evaluation are essential for minimising the occurrence of restorative overhangs. Early identification and correction of defective restorations may reduce plaque accumulation, improve periodontal health, and prevent further periodontal destruction.

Overall, the present study demonstrated that restorative overhangs are significantly associated with increased plaque accumulation, gingival inflammation, probing pocket depth, clinical attachment loss, bleeding on probing, and periodontal disease severity. These findings reinforce the importance of maintaining proper restorative contours and marginal adaptation during restorative procedures and highlight the need for regular periodontal monitoring of patients with existing restorations. Early detection and correction of restorative overhangs may play a crucial role in preventing periodontal disease progression and improving long-term oral health outcomes.

CONCLUSION

Restorative overhangs were significantly associated with increased plaque accumulation, gingival inflammation, probing pocket depth, and clinical attachment loss. Teeth

with overhanging restorations exhibited greater periodontal disease severity compared with teeth having properly contoured restorations. Early detection and correction of restorative overhangs are essential for maintaining periodontal health and preventing disease progression.

REFERENCES

- Brunsvold, M. A., & Lane, J. J. (1990). The prevalence of overhanging dental restorations and their relationship to periodontal disease. *Journal of Clinical Periodontology*, 17(2), 67–72. <https://doi.org/10.1111/j.1600-051X.1990.tb01064.x>
- Eid, M. (1987). Relationship between overhanging amalgam restorations and periodontal disease. *Quintessence International*, 18(11), 775–781.
- Raju, P. V. (1996). *Indian Journal of Dental Research*, 7(1), 21–27.
- Albandar, J. M. (1995). *Journal of Periodontology*, 66(4), 249–254. <https://doi.org/10.1902/jop.1995.66.4.249>
- Leon, A. R. (1977). *Journal of Oral Rehabilitation*, 4(2), 105–117. <https://doi.org/10.1111/j.1365-2842.1977.tb00972.x>
- Matthews, D. C. (2004). *Periodontology 2000*, 34, 136–150. <https://doi.org/10.1046/j.0906-6713.2003.003429.x>
- Passariello, C. (2012). *Clinical Oral Investigations*, 16(3), 987–995. <https://doi.org/10.1007/s00784-011-0585-0>
- Petersen, R. C., Liu, P. R., & Reddy, M. S. (2020). *EC Dental Science*, 19(2). <https://www.econicon.com/ecde/pdf/ECDE-19-01347.pdf>
- Katircioğlu, S. K. (2025). *BMC Oral Health*, 25(1), 1441. <https://doi.org/10.1186/s12903-025-06792-8>
- Katircioğlu, S. K. (2025). *BMC Oral Health*, 25, 1441. <https://doi.org/10.1186/s12903-025-06792-8>
- Walsh, L. J. (2013). *Australian Dental Journal*, 58(Suppl. 1), 3–16. <https://doi.org/10.1111/adj.12045>
- Brostek, A. M., Bochenek, A. J., & Walsh, L. J. (2006). *Shanghai Kou Qiang Yi Xue*, 15(3), 225–249.
- Llena, C. (2009). *Journal of Contemporary Dental Practice*, 10(3), 1–9.
- Chalmers, J. M. (2008). *Dental Today*, 27(4), 132, 134, 136.
- Keogh, T. P. (2001). *Dental Clinics of North America*, 45(1), 83–102.
- Brunsvold, M. A., & Lane, J. J. (1990). The prevalence of overhanging dental restorations and their relationship to periodontal disease. *Journal of Clinical Periodontology*, 17(2), 67–72. <https://doi.org/10.1111/j.1600-051X.1990.tb01064.x>
- Eid, M. (1987). Relationship between overhanging amalgam restorations and periodontal disease. *Quintessence International*, 18(11), 775–781.
- Raju, P. V., Varma, B. R., & Bhat, K. M. (1996). *Indian Journal of Dental Research*, 7(1), 21–27.
- Albandar, J. M. (1995). *Journal of Periodontology*, 66(4), 249–254. <https://doi.org/10.1902/jop.1995.66.4.249>
- Leon, A. R. (1977). *Journal of Oral Rehabilitation*, 4(2), 105–117. <https://doi.org/10.1111/j.1365-2842.1977.tb00972.x>

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