

# The Prevalence of Restoration Overhang in Patients Referred to the Dental Clinic of Guilan University of Medical Sciences

## *Original Article*

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## **Abstract**

### **Introduction:**

Overhang refers to the extension of restoration material from the cavity. It has an important role in decay, plaque accumulation and periodontal disease, so the aim of this study is determining the frequency of restoration overhang in patients in Anzali, Guilan.

### **Materials and methods:**

This descriptive cross-sectional study was completed using 293 patients who visited for routine check-ups. The overhangs were examined on the basis of the cavity type, restoration type, tooth location, and age by direct observation using an explorer, dental floss. After the initial diagnosis of the overhang, the radiographic reports were examined for final confirmation.

### **Results:**

41.2%, 0%, 18.2%, and 38.1% were observed in cavity classes II, III, IV, and V, respectively. 35.8%, 38.2%, 28.1%, and 25% were observed in mesial, distal, buccal, and lingual regions, respectively. The highest rate of overhang frequency in the first molar teeth was 50% and the lowest overhang amount occurred in the lateral and canine teeth at 25% and 27.3%, respectively. Most amalgam restorations had overhang (37.7%) and the highest amount of overhang was in the upper jaw (42.5%). The highest amount of overhang frequency was observed on the left (41.6%). There was no significant difference in overhang frequency between men and women. The lowest and highest amounts of overhang were observed in the age groups of <30 (26.9%) and 30–39 (47.8%), respectively, and was found to be statistically significant.

### **Conclusion:**

The overall frequency of restoration overhang was 36.6%, most of which was in class II amalgam restoration in the left first molar teeth in 30–39 year-olds.

### **Key words:**

•Dental Restoration Failure• Dental Calculus• Prevalence

## Introduction

The main cause of gingival inflammation is due to bacterial plaques along with predisposing factors such as calculus, overhang, orthodontic therapy, smokeless tobacco, radiation therapy, iatrogenic factors, and the materials used in restoration (the design of removable partial dentures).<sup>(1)</sup>

The most commonly encountered local factor causing periodontal disease in adults is the overhanging dental restorations.<sup>(2)</sup> Overhanging dental restoration refers to the extension of the restorative material beyond the confines of the prepared cavity.<sup>(2)</sup>

Faulty restoration methods<sup>(3)</sup> and the morphologic variation in the cervical aspect of the tooth, including furcation, fluting, and concavities contribute to poor restoration with overhang, which makes it difficult to consistently place a wedge and matrix band to fully adapt to the gingival cavomargin<sup>(4)</sup>. Restoration overhangs have been described as permanent calculus and causes plaque accumulation, caries, and periodontal disease.<sup>(4)</sup>

Overhanging margins of dental restorations contribute to the development of periodontal disease by changing the ecologic balance of the gingival sulcus to an area that favors the growth of disease-associated organisms (predominately Gram-negative anaerobic species). This is at the expense of the health-associated organisms (predominately Gram-positive facultative species) and through inhibiting the patient's access to remove accumulated plaque.<sup>(1)</sup>

The position of gingival margin compared with the restoration margin is directly effective on adjacent periodontal tissues.<sup>(5)</sup> A high statistical correlation has been reported among incorrect restoration margins and periodontal disease, and the reduction in bone height.<sup>(6-8)</sup> On the other hand, subgingival margins of restorations are usually associated with a high amount of plaque, severe inflammation of the gum and deeper pockets. Even if high quality restorations are placed beneath the gum, they lead to plaque accumulation, gum inflammation, and increased gingival cervicular fluid. Restoration margins that are placed up to the gingival margin cause much less inflammation.<sup>(9-12)</sup> Therefore, restoration must be based on tooth anatomy with respect to quality and conditions of proximal

levels, embrasures, contour, and margin ends.<sup>(3)</sup> In a literature review of overhang dental restorations and the effect on the periodontium, researchers reported a prevalence range of interproximal overhang from 25% to 76% dependent on the importance of correct restoration in tooth supporting tissues.<sup>(8)</sup>

Alizadeh Oskooie et al. (2009) studied the overhang of amalgam restorations of dental students in Tabriz and found that the overall prevalence of this problem was 25.7%; 23.5% was related to MOD proximal cavities; and 23% to MOD cavities. In total, 29% was also related to amalgam crown buildup.<sup>(13)</sup>

We aimed to assess the overhang frequency in patients who visited the Dental Clinic of Guilan University of Medical Sciences, during 2013–2014.

## Materials and Methods

This descriptive cross-sectional study was completed using 293 patients who visited the diagnostic section of the clinic for oral and dental check-ups. All individuals who visited the clinic were examined by a central disposable mirror (Faizteb, Iran) and an explorer D&P (Dental device, Pakistan) under the light of a dental chair. People with trismus or mental disorders such as mental retardation, which hindered effective communication, were excluded. Following this, those patients that had at least one restoration in proximal, buccal or lingual surfaces of the teeth were included.

Visual and tactile examination with the explorer and dental floss (Oral B, P & G Gross Gerar, Germany) was also completed. The explorer moved from the proximal through the gingival to the occlusal regions. Flossing tape was then passed from tooth contact. In case of sticking or tearing of the flossing tape, the existence of overhang was suspected and to confirm clinical findings, Bitewing or periapical radiography was operated on respective regions (Bitewing radiography for posterior teeth and periapical radiography for anterior teeth). Radiographies were conducted with Kodak photographic film (Estman Kodak, New York, America) and Minray radiographic equipment (Soredex, Tuusula, Finland), including a manual Xray film processor (Taksan, Tehran, Iran)

Existence or non-existence of overhang was assessed after the processing of the Bitewing or periapical film. Prepared films collected from patients were examined on Negatoscope by the operator (student).

Data was analyzed using SPSS software, version 21. The confidence interval was set at 95%. The chi-square test was used to compare the overhang frequency with respect to tooth surface, tooth type, and so forth. P value of <0.05 was considered statistically significant.

## Results

The mean  $\pm$  SD age of the 293 studied patients was  $40.37 \pm 12.41$  (range: 16–73). There were 149 (50.9%) women and 144 (49.1%) men. In total, 768 teeth (3072 surfaces) were examined among which 1016 surfaces had received at least one interproximal restoration or one restoration in buccal or lingual surfaces. According to Figure 1 from 1016 restoration surfaces, 372 surfaces had an overhang (36.6%). Furthermore, according to these results, the total frequency of overhang was 36.6%. With respect to dental surfaces, distal, mesial, buccal, and lingual overhang was 38.2%, 35.8%, 28.1%, and 25% ( $P = 0.497$ ), respectively (Figure 2).

We found that the highest overhang frequency was in posterior teeth although the difference between posterior and anterior teeth was not

significant ( $P = 0.376$ , table 1). The highest overhang frequency with respect to cavity type was observed in class II cavities (41.2%) and the lowest overhang frequency was seen in class III cavities (0%) ( $P = 0.038$ , table 2). We found that amalgam restorations had the highest overhang frequency compared with composite restorations ( $P = 0.011$ , table 3).

The highest and lowest overhang frequency was seen in the first molar and lateral/canine teeth ( $P = 0.006$ , Figure 3). With respect to jaw type, overhang frequency was higher in the maxilla compared with the mandible ( $P = 0.162$ , table 4). Moreover, overhang was less frequent in people younger than 30 years of age while it was most frequent in 30–39 year-olds ( $P = 0.0001$ , table 5).

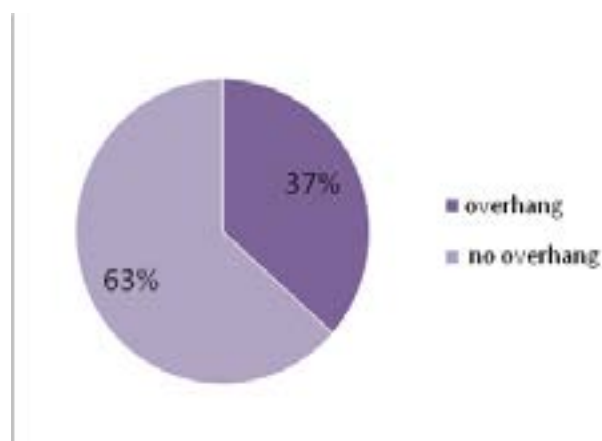


Figure 1. The frequency of overhang

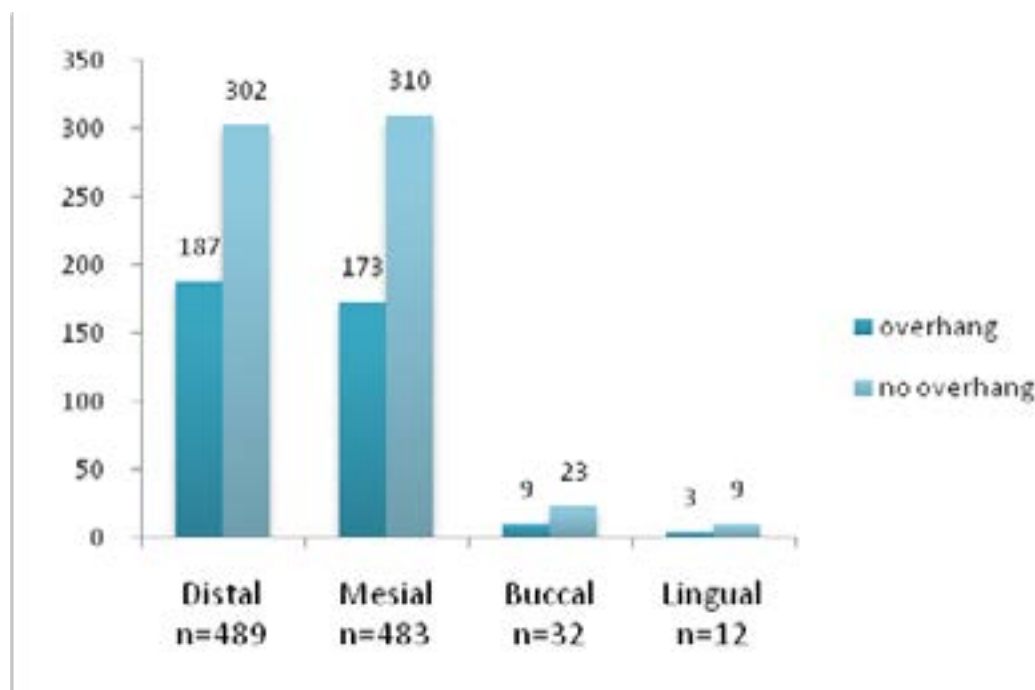


Figure 2. Distribution of the frequency according to the surface

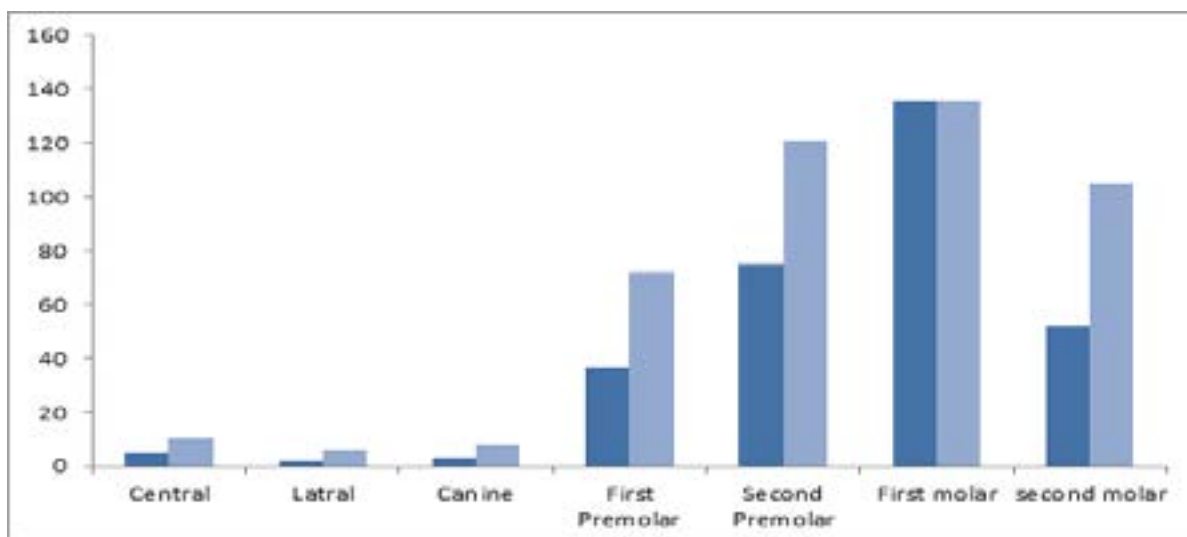


Figure 3. The Frequency overhang according

Table1: Frequency (%)of overhangs according to the surface

	Overhang(%)	No Overhang(%)	P value
Anterior n=37	11(29.7%)	26(70.3%)	0.376
Posterior n=979	361(36.9%)	618(63.1%)	

Table 2: Frequency (%)of overhang according to the type of cavity

	Overhang(%)	No Overhang(%)	P value
II n=747	308(41.2%)	439(58.8%)	0.038
III n=8	0(0%)	8(100%)	
IV n=11	2(18.2%)	9(81.8%)	
V n=42	16(38.1%)	26(61.9%)	

Table 3. Frequency (%) of overhang according to the type of restoration

Type of the restoration	Overhang(%)	No Overhang(%)	P value
Amalgam n=702	293(41.7%)	409(58.3%)	0.011
Composite n=66	17(25.8%)	49(74.2%)	

## Discussion

Overhang is one of the most common local factors contributing to periodontal disease in adults.<sup>(2)</sup> Restoration overhangs are a permanent calculus, which causes plaque accumulation, caries, and the occurrence of periodontal disease.<sup>(4)</sup> We assessed overhang using both clinical and radiographic methods. Clinical examination

was performed using a diagnostic explorer and dental floss.<sup>(3)</sup> Moreover, Bitewing<sup>(13,14)</sup> and periapical<sup>(12)</sup> radiographies were used to confirm clinical findings. Bitewing radiography was conducted to consider overhangs in posterior teeth and periapical radiography was performed to observe overhangs in anterior teeth. In a previous study, similar instruments such as an explorer, dental floss, and radiography were used.<sup>(3)</sup> In this study, the most applicable tool for overhang discovery was the explorer.

Consistent with our study, Burch<sup>(14)</sup>, Parsell<sup>(15)</sup>, Gilmore<sup>(16)</sup>, Ibraheem<sup>(17)</sup>, and colleagues also used posterior Bitewing radiography to assess overhanging margins. Moreover, Sikri and colleagues assessed the prevalence of overhanging margins and their side effects.<sup>(2)</sup> Similar to our study, they used periapical radiography and periodontal probes to evaluate the periodontium condition. Overhang frequency was 36.6% in our study, which is consistent with other previous studies.<sup>(13,16,18)</sup>

We found a higher frequency of overhang in distal surfaces ( $P = 0.498$ ), which is in line with previous studies.<sup>(17,19)</sup> This could be attributed to difficulty in accessing distal surfaces compared with other surfaces during restoration.

In our study, posterior teeth had the highest frequency of overhang, which is consistent to previous research<sup>(6,7,16,20)</sup>, reporting that 50% of posterior teeth have overhanging margins.

We found that type II and type III cavities had the highest and lowest overhang frequency. These results are not consistent with those obtained by Aminian and co-workers.<sup>(3)</sup> This difference may

be due to the fact that we assessed overhanging margins in amalgam and composite restorations while in the mentioned study only created overhangs by students associated with composite restorations were studied. Most samples in our study had amalgam restorations instead of composite ones. This could be the reason why overhang frequency was more frequent in amalgam restorations.

Similar to two other studies<sup>(18,19)</sup>, overhang frequency was higher in the maxilla than the mandible, which is attributed to the easy accessibility of the mandible during restoration. The highest overhang frequency in our study was seen in the molar teeth because of the difficulty in accessing the region and the dentist's indirect vision. This finding was similar to one other study.<sup>(19)</sup>

Furthermore, unlike other studies, we assessed overhang frequency with respect to sex and side of jaw, and found there was no significant difference between groups.

Because of a lower number of composite restoration samples, it is recommended to consider composite overhang frequency in future studies.

## Conclusion

The highest amount of overhang frequency was observed in distal teeth, which may be a result of the difficult accessibility of this area during restoration and for operator. Amalgam restorations have more overhanging margins, whereby most of them are observed in posterior teeth especially in the first molar teeth of the maxilla. The most common cavity type was type II, which therefore, had the highest overhang frequency.

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