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The prevalence of Overhang Margins with Class II Restorations among Sulaimani City Patients

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Abstract

Background: Overhanging dental restorations are defined as a horizontal mismatch in the smooth and approximate surfaces of the restorations. A significant prevalence and degree of severity of periodontal problems are associated with the presence of overhang margins restorations.

Aim: This study aimed to determine the prevalence of overhang margins in patients with class II restorations.

Materials and Methods: An observational cross-sectional study was performed in 200 patients attending Shorsh Teaching Dental Center in Sulaimani City of Iraq. Patients were examined using sterilized patient examination kits and under the dental chair light. After the initial diagnosis of the overhang, final confirmation was obtained with the radiographic studies. For data collection, gender, age, time of restoration, type of material used, daily home care, and any history of gingival bleeding or inflammation were obtained. Data was analyzed using SPSS software, version 21.

Results: The results of this study showed the prevalence of overhang in 296 (38.3%) examined teeth, including 190 (44.2%) upper teeth, and 106 (30.9%) lower teeth, 202 (43.7%) molar teeth and 94 (30.2%) premolar teeth, 241 (64.6%) composite teeth, and 55 (35.4%) amalgam teeth, 110 (37.1%) mesial teeth, and 186 (62.9%) distal overhang teeth, that 152 (51.4%) overhang teeth occurred in men and 144 (48.6%) overhang teeth occurred in women.

Conclusion: The results of this study showed that the frequency of overhang was relatively high in the examined teeth. The results of this study showed the highest frequency of overhang in composite teeth. Overhang treatment and removal appear to be necessary to minimize periodontal risks.

Keywords: Overhanging dental restorations, Overhanging, Prevalence, Amalgam overhang

Introduction

Overhanging dental restorations (ODRs) are defined as a horizontal mismatch in the smooth and approximate surfaces of the restorations (1) and the extension of amalgam restorative material beyond or behind the lines of cavity preparation, leading to an environmental change in the balance between beneficial bacteria and periodontal pathogens, leading to periodontal breakdown (2). ODR means extending the restorative material beyond the prepared cavity (3). A significant prevalence and degree of severity of periodontal problems are associated with the presence of ODRs. ODRs as a permanent calculus cause plaque accumulation, caries, and periodontal disease (4).

High proportions of restorations appear as having overhanging margins, ranged from 32% (5) to 75% (6) according different studies. Overhanging margins are responsible for many iatrogenic periodontal diseases and the adverse effects of poor restorations on the health of adjacent periodontal tissues are significant (7). Many factors may influence the occurrence of ODR, include operator skills, anatomical reasons, dental morphology, type and location of the tooth, and restoration type (1). ODR is the most common local cause of periodontal disease in adults (8). ODRs by shifting the ecological balance of the gingival sulcus to an area conducive to the growth of disease-associated organisms, contribute to the development of periodontal diseases (9) including inflammation, serious attachment and bone loss, increased prevalence of gingival inflammation and remarkable alveolar bone loss, a deeper pocket, and secondary caries (1, 10).

Wrong restoration methods including proximal overhang is often the reason of many pathological conditions in dental tissues, including gingivitis or gum disease ,bone destruction and finally loss of teeth, whereas correct restoration may maintain or return health of soft tissue and periodontal fibers (3). According to the effect of different matrix systems, overhang formation at the margins is more likely with plastic matrices than metal matrices (11).

The frequency of overfilled margins has been observed mostly in maxillary molar teeth (13.3 % - 72 %), which is related to the difficulty of indirect vision and limited access to this area. Also, the lowest hanging restorations have been observed in the mandibular premolar teeth (1.3 % - 6.4%) (12, 13). The prevalence of ODRs are also more frequent in the distal surfaces of posterior teeth, and that maybe related to poor availability during packing of restoration (4, 14). In a study in Erbil city of Iraq on 1200 patients, the prevalence of amalgam overhang using dental mirror followed by radiographic studies was 59.4%, 40.6%, 64.6%, and 36.4% for the upper teeth, lower teeth, distal surface, and mesial surface, respectively (2). In a study on Iranian patients the frequency of ODRs were 41.2%, 0%, 18.2%, and 38.1% in cavity classes II, III, IV, and V, respectively, and the highest rate of overhang frequency was observed in the first molar teeth. Overlay the frequency of restoration overhang was 36.6% (4).

In another study in Iran the prevalence of ODR in dental students was 25.7% (15). In class II cavities, more than half of the ODR margins were located in the distal interfaces (12). According to the detection methods, among all the overhanging margins, 74% diagnosed through radiographic studies, and 62% diagnosed through clinical symptoms (16). Faulty restoration

methods 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 (17). Removal of restorative overhang has been shown to significantly improve the condition of the periodontal tissue (1).

Research has shown that after removal of ODRs, the condition of periodontal tissues is significantly improved (18). To avoid all possible mentioned complications, early diagnosis and treatment of ODRs is essential. Since the prevalence of ODR in different studies has been estimated in different ranges from 22% to 72%, and (1), this study aimed to determine the prevalence of overhang margins in patients with class II Restorations attending Shorsh Dental Center in Sulaimani City.

Patients and Methods

An observational descriptive cross-sectional study was performed during one year period in patients attending Shorsh Teaching Dental Center in Sulaimani City of Iraq, to evaluate the percentage of patients having overhang restoration and the gender distribution of ODR. Patients from both genders and different age groups were included and examined using sterilized patient examination kits and under the dental chair light. The overhang was examined by dental floss and dental probe by direct observation on the base of cavity type, restoration type, tooth location, and age. After the initial diagnosis of the overhang, final confirmation was obtained with the radiographic studies (Posterior-anterior (PA) or between). For data collection a predesigned questionnaire was used for each patient, including gender, age, time of restoration, type of material used, daily home care, and any history of gingival bleeding or inflammation. The sample size was estimated to be 200 patient.

Inclusion criteria were include patients having at least one side dentation for both male and female patients, and no limitation for having systemic disease or taking any medication. Participants with wisdom teeth, and individuals with mental disorders such as mental retardation that prevent effective communication were excluded from the study.

Data was analyzed using SPSS software, version 21. The statistical analysis includes descriptive statistics both Mean and Standard deviation. The chi-square test was used to compare the overhang frequency with respect to tooth surface. P value of <0.05 was considered statistically significant.

For ethical consideration written patients' consent were taken from the patients after full explanation of the procedures. The aim of the study was explained to the participants by researcher at time of interview. Participants were reassured of the anonymity and confidentiality of the results and they had the right to withdraw from the study at any stage.

Results

In this study, 773 teeth were examined. The results showed that 296 (38.3%) teeth had overhang and the rest of the teeth (61.7%) were 474 teeth with no overhang (Figure 1).

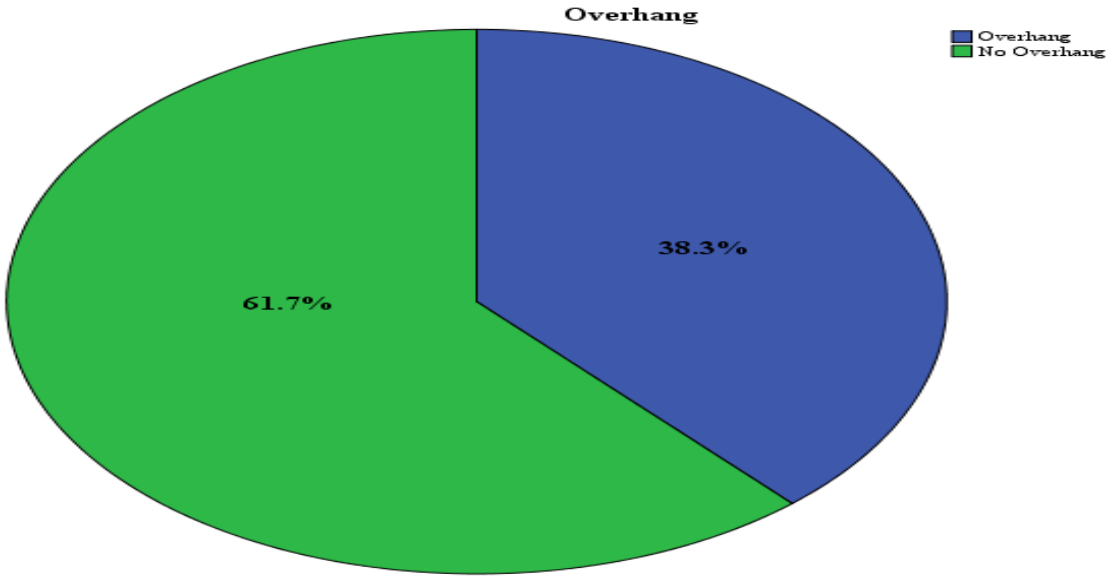

Figure (1). Frequency of Overhang in participants

Examination of upper and lower teeth showed that 190 (44.2%) upper teeth and 106 (30.9%) lower teeth had overhang. Also, 240 (55.8%) upper teeth and 237 (69.1%) lower teeth had no overhang, and there was a significant difference between upper and lower teeth in terms of having or not having an overhang (P < 0.001) (Table 1).

Table (1). Distribution site teeth according surface (Upper and lower)

Sites	Overhang N (%)	No Overhang N (%)	P-Value*
Upper N=430	190 (44.2%)	240 (55.8%)	<0.001
Lower N=343	106 (30.9%)	237 (69.1%)	

* P-value chi-square

Examination of molar and premolar teeth showed that 202 (43.7%) molar teeth and 94 (30.2%) premolar teeth had overhang. Also, 260 (56.3%) molar teeth and 217 (69.8%) premolar teeth had no overhang, and molar and premolar teeth were significantly different in terms of having or not having an overhang (P < 0.001). (Table 2).

Table (2). Distribution site teeth according surface (Molar and Premolar)

Sites	Overhang N (%)	No Overhang N (%)	P-Value
Molar N=462	202 (43.7%)	260 (56.3%)	<0.001
Premolar N=311	94 (30.2%)	217 (69.8%)	

* P-value chi-square

Examination of composite and amalgam teeth showed that 241 (38.9%) composite teeth and 55 (35.4%) amalgam teeth had Overhang. Also, 377 (61.1%) composite teeth and 100 (64.6%) amalgam teeth had no overhang, and there was no significant difference between composite and amalgam teeth in terms of having or not having an Overhang (Table 3).

Table (3). Distribution site teeth according surface (Composite and Amalgam)

Sites	Overhang N (%)	No Overhang N (%)	P-Value
Composite N=618	**241 (38.9%)**	**377 (61.1%)**	**0.4**
Amalgam N=155	**55 (35.4%)**	**100 (64.6%)**	

* P-value chi-square

Examination of mesial and distal teeth showed that 110 (35.4%) mesial teeth and 186 (40.2%) distal teeth had overhang. Also, 200 (64.6%) mesial teeth and 277 (59.8%) distal teeth had no Overhang, and mesial and distal teeth had no significant difference in terms of having or not having Overhang (Table 4).

Table (4). Distribution site teeth according surface (Mesial and Distal)

Sites	Overhang N (%)	No Overhang N (%)	P-Value
Mesial N=310	**110 (35.4%)**	**200 (64.6%)**	**0.18**
Distal N=463	**186 (40.2%)**	**277 (59.8%)**	

* P-value chi-square

The examination of overhang teeth according to gender showed that out of 432 male teeth, 152 (35.2%) had overhang and out of 344 female teeth, 144 (41.9%) had overhang.

Having or not having an overhang of the teeth is shown in Figure 2. The results showed that out of 618 composite teeth, 241 (39%) had overhang and 377 (61%) had no overhang. Out of 155 amalgam teeth, 55 (35.5%) had overhang and 100 (64.5%) had no overhang. Also, out of 463 distal teeth, 186 (40.2%) had overhang and 277 (59.8%) had no overhang. Out of 310 mesial teeth, 100 (35.5%) had overhang and 200 (64.5%) had no overhang.

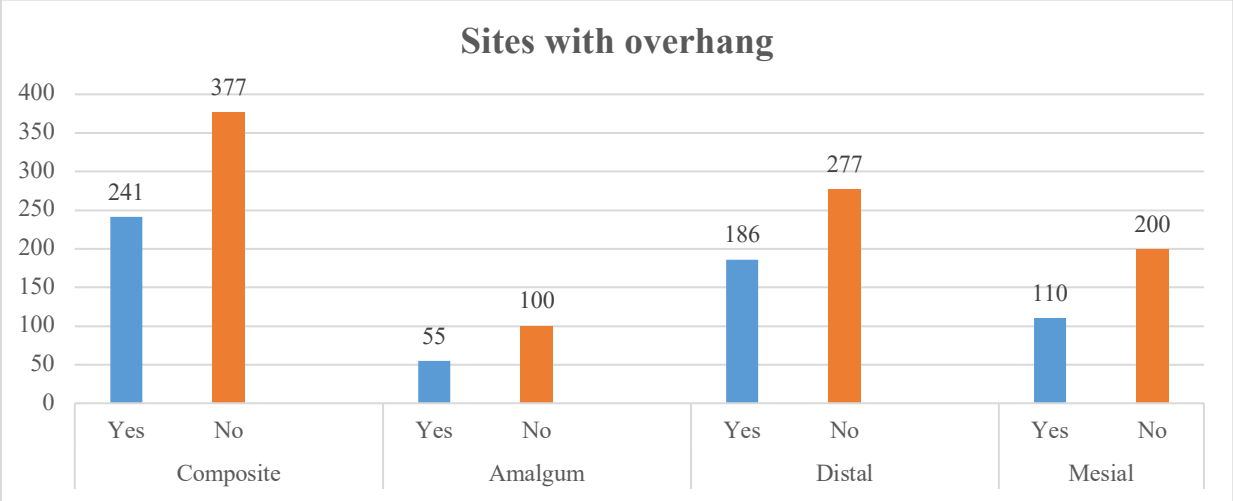

Figure (2). The frequency of overhang / no overhang according to the type of teeth

The frequency of overhang according to the type of teeth showed in Figure 3 include 241 (39%) composite teeth, 55 (35.5%) amalgam teeth, 186 (40.2%) distal teeth, and 100 (35.5%) mesial Overhang teeth.

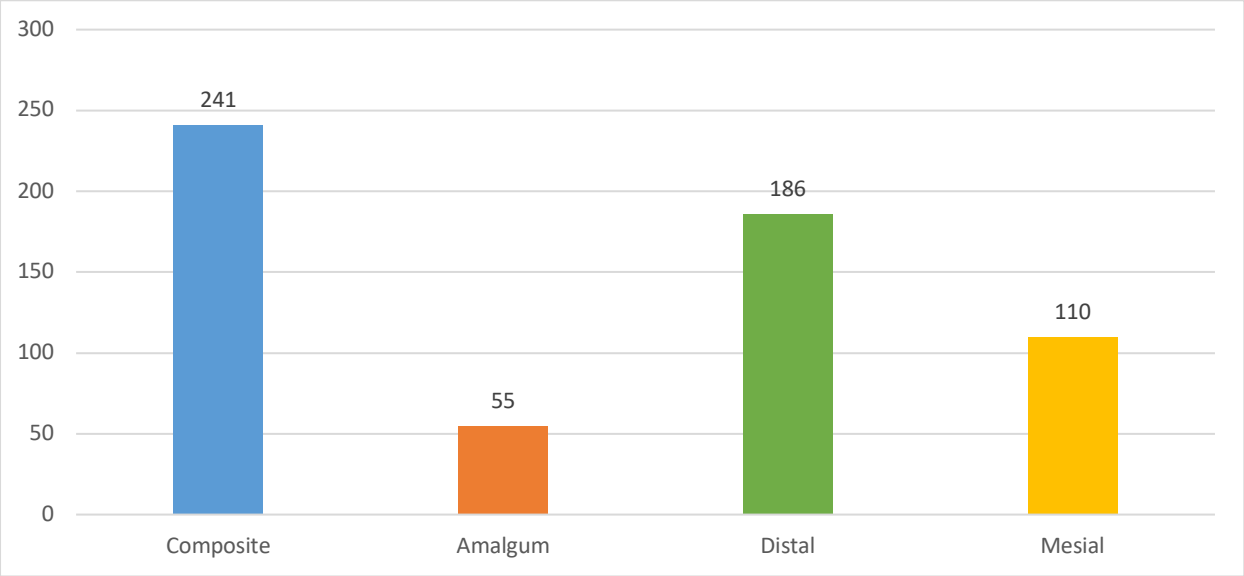

Figure (3). The frequency of overhang according to the type of teeth

Problems related to overhang teeth are shown in Figure 4 where 436 teeth had gingival bleeding problem, 220 teeth had problem during flossing, 84 teeth had history of pain, and 150 teeth had history of food impaction.

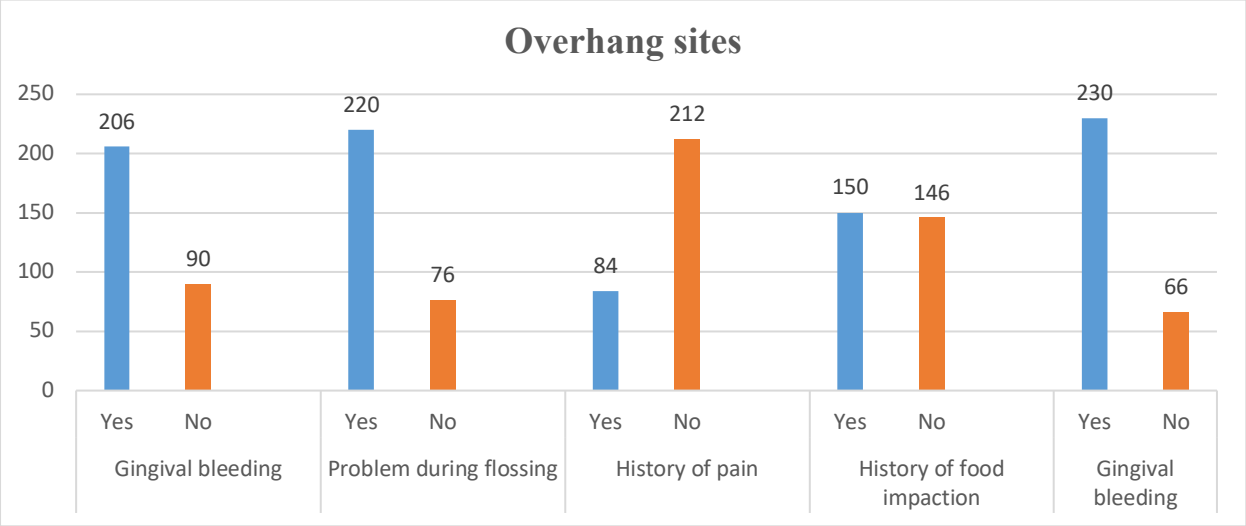

Figure (4). Problems related to overhang teeth

In total, 190 (44.2%) upper teeth, 106 (30.9%) lower teeth, 202 (43.7%) molar teeth, and 94 (30.2%) premolar teeth had overhang, and 240 (55.8%) upper teeth, 237 (69.1%) lower teeth, 260 (56.3%) molar teeth, and 217 (69.8%) premolar teeth had no overhang (Figure 5).

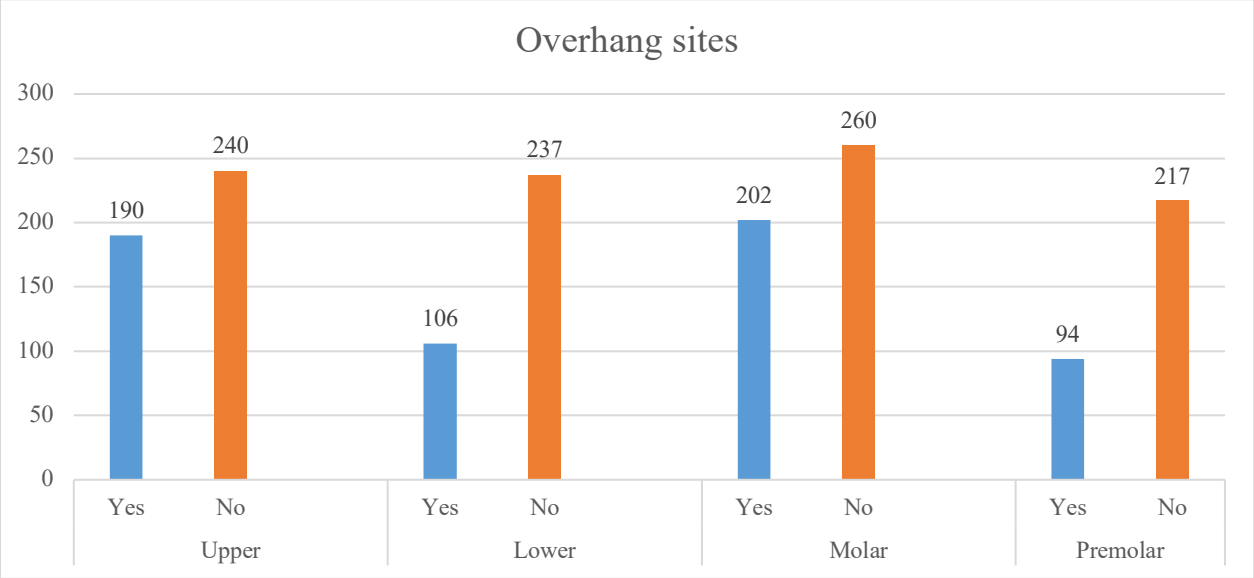

Figure (5). Overhang / No Overhang sites

Also, 190 (44.2%) upper teeth, 106 (30.9%) lower teeth, 202 (43.7%) molar teeth, and 94 (30.2%) premolar teeth had overhang (Figure 6). Also, 110 (35.4%) mesial teeth and 186 (40.2%) distal teeth had overhang, and 200 (64.6%) mesial teeth, and 277 (59.8%) distal teeth had no overhang. The results of the study showed that 241 (38.9%) composite teeth and 55 (35.4%) amalgam teeth had overhang. Also, 377 (61.1%) composite teeth, and 100 (64.6%) amalgam teeth had no overhang, and 202 (43.7%) molar teeth and 94 (30.2%) premolar teeth had overhang. Also, 260

(56.3%) molar teeth and 217 (69.8%) premolar teeth had no Overhang. Also, 190 (44.2%) upper teeth, and 106 (30.9%) lower teeth had overhang, and 240 (55.8%) upper teeth, and 237 (69.1%) lower teeth had no overhang.

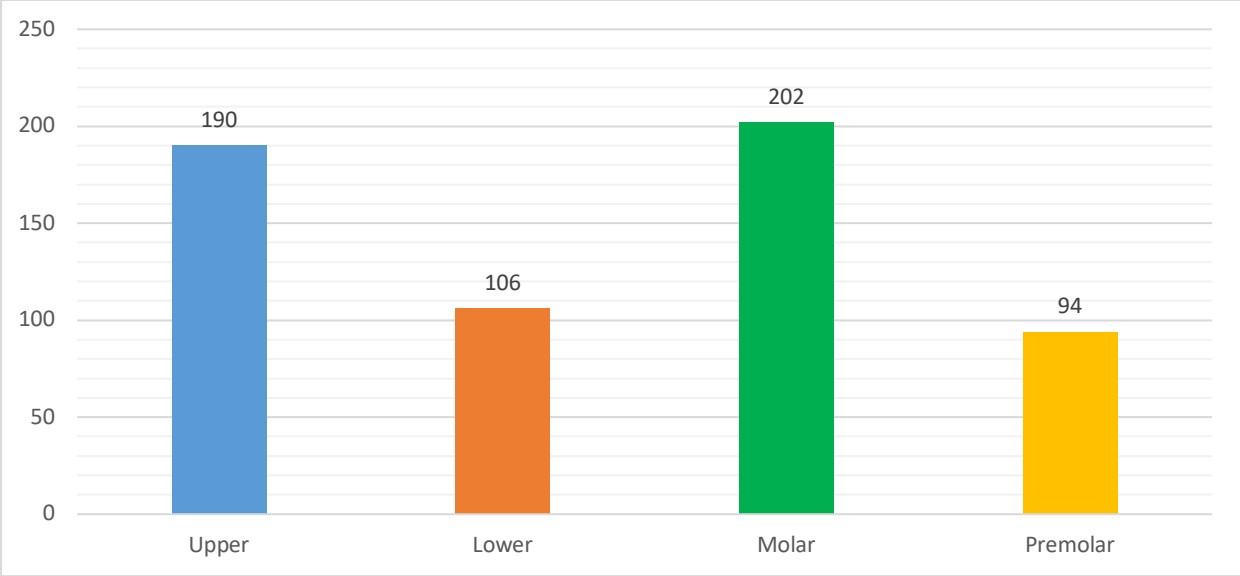

Figure (6). Overhang sites

Discussion

This study was conducted with the aim of determining the frequency of interproximal overhang among the patients of Sulaimani City. Based on the results of this study, the prevalence of Overhang was 38.2%. Upper teeth had more overhang compared to lower teeth. Molar teeth had more overhang than premolar teeth. Composite teeth than amalgam teeth, and distal teeth than mesial teeth had more overhang. Also, the results showed that the proportion of overhang teeth was higher in women than in men. Gingival bleeding, problem during flossing, history of pain and history of food impaction were problems related to overhang teeth. Among upper, lower, molar, premolar, composite, amalgam, distal and mesial teeth, no overhang teeth are more than overhang teeth.

The results of various studies have reported the overall prevalence of overhang to be very high. Based on the results of different studies, the prevalence of overhang was between 32% (5) to 75% (6), which is consistent with the results of the present study. Also, in the study conducted in England, the prevalence of overhang in the studied samples was reported to be over 50% (19). In another study, the prevalence of overhang was found to be 3% (20). This variation in the results of different studies can be due to the difference in examination methods, the type of tool used to detect overhang, the difference in the skill of the operators and the difference in the type of restorative material used.

In this study, upper teeth had more overhang compared to lower teeth, but in the study conducted by JH Kamel and FD Salman (2023) (21) in Iraq, it was seen that lower teeth have more overhang. In the study in Iran (4), and Turkey (22) it was consistent with the results of the present study and more overhang was seen in the upper teeth and this difference in the overhang of the upper and lower teeth was significant.

More overhang in molar teeth compared to premolar teeth in this study was consistent with the results of MB Dindar et al. (2022) (23) so that the molar teeth had the most overhang. In the study of Turkey by MT ATAY et al. (2020) (12) it was shown that the overhang in molar teeth was more than in premolar teeth and this difference was significant.

It was found that overhang in distal teeth was more than mesial teeth. In the study of Iran in 2017 (24), which was conducted with the aim of investigating the frequency of overhang, it was shown that the frequency of overhang is higher in distal teeth than in mesial teeth. In the study in Pakistan (14) with the aim of determining the frequency of overhang, it was also shown that in most cases the frequency of overhang in distal teeth was higher than in mesial teeth, which results of these two studies were consistent with the results of the present study.

In most studies, it has been shown that amalgam restoration teeth have more overhang than composite teeth (1, 14, 19). In this study, despite the fact that composite overhang teeth had more than amalgam restorative teeth, this difference was not significant.

The most common overhang problems in the examined teeth were gingival bleeding, problems during flossing, history of pain, history of food impaction, and these identified problems are consistent with the results of other studies (25-27). It is also important to note that based on the studies conducted in teeth with an overhang, the height and density of the marginal bones under the overhang will decrease (28) and it will be necessary to pay attention to this point in the treatment process.

Conclusion

Based on the available information, it was shown that the frequency of overhang is relatively high in the investigated teeth. The results of this study further showed the frequency of overhang in composite teeth. Overhang treatment and removal appear to be necessary to minimize periodontal risks.

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Declaration of conflict of interest: None of the authors has any conflict of interests.

References:

1. AlTowayan SA. The Prevalence of Overhanging Restorations, Effects and Prevention. Journal of International Dental and Medical Research. 2023;16(3):1342-7.
2. Yawer Aldakawi DM, Saeed DH, Saleem Almola WM. The Prevalence of Amalgam Overhang in Erbil City Population. Polytechnic Journal. 2020;10(1):10. doi.org/10.25156/ptj.v10n1y2020.pp56-60
3. Aminian R, Ghassemi A, Shahali F. Prevalence of overhang in tooth-colored restorations conducted in operative department of Shahid Beheshti dental school: 2001-2002. 2006.
4. Tavangar M, Darabi F, TAYEFEH DR, VADIATI SB, JAHANDIDEH Y, KAZEMNEJAD LE, et al. The prevalence of restoration overhang in patients referred to the dental clinic of Guilan University of Medical Sciences. J Dentomaxillofacial Radiol Pathol Surg. 2016.
5. Gilmore N, Sheiham A. Overhanging dental restorations and periodontal disease. 1971.
6. Al B. Marginal fit of restorations and its relation to periodontal bone levels. I. Metal fillings. Odontol Revy. 1969;20:311-21.
7. Ali AKA. The prevalence of overhanging margins in posterior filling restorations and periodontal consequences. Journal of baghdad college of dentistry. 2012;24(special issue 1).
8. Sikri V, Sikri P. Overhanging interproximal silver amalgam restorations. Prevalence and side-effects. Indian Journal of Dental Research: Official Publication of Indian Society for Dental Research. 1993;4(1):13-6.
9. Hinrichs JE, Math VT. The role of dental calculus and other local predisposing factors. Carranza's Clinical Periodontology St Louis, MO: Elsevier, Saunders Elsevier. 2012:217-31.
10. Rodriguez-Ferrer H, Strahan J, Newman H. Effect on gingival health of removing overhanging margins of interproximal subgingival amalgam restorations. Journal of Clinical Periodontology. 1980;7(6):457-62.
11. Mullejans R, Badawi M, Raab W, Lang H. An in vitro comparison of metal and transparent matrices used for bonded class II resin composite restorations. Operative Dentistry. 2003;28(2):122-6.
12. ATAY MT, DİNDAR MB, ÖZYURT E, ÇİLİNGİR A, ERDEMİR U. Frequency and Localization of Overhanging Restorations. Cumhuriyet Dental Journal. 2020;23(2):116-23. doi.org/ 10.7126/cumudj.677099
13. Kheyzaran B, Nasim HS, Mohsen A, Sajad AF. Evaluation the Overhang Rate in Class II Amalgam Restorations among Bandar Abbas Patients in 2015. Journal of Research in Medical and Dental Science. 2018;6(1):151-6.
14. Quadir F, Ali Abidi S, Ahmed S. Overhanging amalgam restorations by undergraduate students. J Coll Physicians Surg Pak. 2014;24(7):485-8.
15. Oskoee PA, Kimyai S, Oskoee SS, Asdagh S. Prevalence of proximal overhanging margins in posterior amalgam restorations performed by Tabriz Dental Faculty Students. Medical Journal of Tabriz University of Medical Sciences. 2009;31(1):53-6.
16. Pack AR, Coxhead LJ, McDonald BW. The prevalence of overhanging margins in posterior amalgam restorations and periodontal consequences. Journal of Clinical Periodontology. 1990;17(3):145-52.

17. JB S. Robbins JW. Hilton TJ. Schwartz RS. Santos J Jr. Fundamentals of Operative Dentistry: A Contemporary Approach 3rd edition. Illinois. Quintessence Publishing Co, Inc; 2006.
18. Highfield J, Powell R. Effects of removal of posterior overhanging metallic margins of restorations upon the periodontal tissues. Journal of Clinical Periodontology. 1978;5(3):169-81.
19. Millar B, Blake K. The influence of overhanging restoration margins on interproximal alveolar bone levels in general dental practice. British Dental Journal. 2019;227(3):223-7. doi.org/10.1038/s41415-019-0530-1
20. Bazerbashi J, Alkhubaizi Q, Parsa A, Shabayek M, Strassler H, Melo MAS. Prevalence and Characteristics of Radiographic Radiolucencies Associated with Class II Composite Restorations. Applied Sciences. 2023;13(8):4780. doi.org/10.3390/app13084780
21. Hussein Kamel J, Dawood Salman F. The Prevalence of Overhang and Gap Formation in Posterior Amalgam and Composite Restorations Among 4th and 5th Stage Undergraduate Students/Tishk University. Acta Scientific Medical Sciences. 2023;7(4):145-56. doi.org/ 10.31080/ASMS.2023.07.1518
22. Tarcin B, Gumru B, Idman E. Radiological assessment of alveolar bone loss associated with overhanging restorations: A retrospective cone beam computed tomography study. Journal of Dental Sciences. 2023;18(1):165-74. doi.org/10.1016/j.jds.2022.06.021
23. Büyükgöze Dindar M, Açıkgöz-Alparslan E, Tekbaş-Atay M. Radiographic Evaluation of Marginal Bone Height and Density Around Overhanging Dental Restorations. International Journal of Periodontics & Restorative Dentistry. 2022;42(3). doi.org/10.11607/prd.5424
24. Ebrahimzadeh-Hassanabadi M, Gharib A, Moaddabi A. The overhang rate in posterior teeth restorations among a sample of patients from Sari City, Iran, in year 2017. Chronic Diseases Journal. 2019:160-4. doi.org/ 10.22122/cdj.v7i3.413
25. Hickel R, Mesinger S, Opdam N, Loomans B, Frankenberger R, Cadenaro M, et al. Revised FDI criteria for evaluating direct and indirect dental restorations—recommendations for its clinical use, interpretation, and reporting. Clinical Oral Investigations. 2023;27(6):2573-92. doi.org/10.1007/s00784-022-04814-1
26. Kumar A, Grover V, Satpathy A, Jain A, Grover HS, Khatri M, et al. ISP good clinical practice recommendations for gum care. Journal of Indian Society of Periodontology. 2023;27(1):4. doi.org/ 10.4103/jisp.jisp_561_22
27. Torres CRG, Barbe AG, Noack MJ, Wicht MJ. Diagnosis and Treatment Planning. Modern Operative Dentistry: Principles for Clinical Practice. 2020:1-42.
28. O'rourke B, Walls A, Wassell R. Radiographic detection of overhangs formed by resin composite luting agents. Journal of Dentistry. 1995;23(6):353-7.