Prevalence of post-restorative sensitivity among the patients receiving class II restorations: An observational study

Shahzeb Hasan Ansari¹, Bader Alhussain², Sara Mansour Al Mowinea², Fatima Abdullah Binyahya³, Maram Majed Al Otaibi³, Sarah Fahad Al Senani³, Albaraa Bin Battal³

¹Lecturer, Department of Preventive Dental Sciences, College of Dentistry, Riyadh Elm University, Riyadh 11681, Saudi Arabia
²Consultant, Department of Restorative Dentistry, College of Dentistry, Riyadh Elm University, Riyadh 11681, Saudi Arabia
³General Dentist, Riyadh Saudi Arabia

Corresponding author
Lecturer, Department of Preventive Dental Sciences, College of Dentistry, Riyadh Elm University, Riyadh 11681, Saudi Arabia;
Email: Shahzebhasan@riyadh.edu.sa

Citation

ABSTRACT
Dental restorations are aimed to protect and restore the normal function and esthetics of teeth, which is the daily bread and butter of a dental practitioner. To achieve these purposes, various types of restorative as well as lining materials have been used over the years. The aim of the research was to determine the prevalence of post-operative pain among the patients visiting REU and the causative factors associated with post-operative sensitivity. This was an observational study, which was conducted among the patients visiting the REU clinics and ethical as well as clinical approval was taken. The class II restorations were placed by dental interns and the procedure was carried out using carbide 330 burs, tofflemire matrix, and total etching technique with universal 3M bonding. The depth of the cavity was measured by the radiograph. Postoperative sensitivity increased with the increase in cavity depth. Patients with liner used during their composite restorations reported more postoperative sensitivity as compared to patients without liner. The most common aggravating factor causing pain was found to be hot & cold. Majority of the participants experienced pain of short duration. Overall, the severity of pain was low.

Keywords: Class II restoration, Sensitivity, Post operative pain
1. INTRODUCTION
Dental restorations are aimed to protect and restore the normal function and esthetics of teeth, which is the daily bread and butter of a dental practitioner. To achieve these purposes, various types of restorative as well as lining materials have been used over the years. The most common complain associated with dental fillings that come from the patients is sensitivity or pain (Dababneh et al., 1999). This occurs during the normal function of teeth and in some cases is unbearable by the patients. Certain restorative materials are linked with the incidence of post restorative sensitivity, which assists the dentist in deciding on choosing the ideal material (Dababneh et al., 1999). Over the years, different materials have been used to overcome the chances of dentine hypersensitivity after the restoration. It can be easily concluded that materials play a secondary role in causing pain, with depth of cavity being the most important factor in causing discomfort to the patients (Brännström, 1986; Perdigão et al., 2003; Taravati et al., 2020).

Furthermore, another factor that is crucial in determining the incidence of pain is dentists’ clinical skills and expertise. Conservative approach is required in order to minimize the risk of post operative pain. Experience of the clinician is essential in controlling the chances of patients’ discomfort. Times are another important determinant of post operative sensitivity. Sensitivity usually occurs within the first few weeks of restoration, which eventually subsides over the period of time (Diwaniyan et al., 2012). Although the composite restoration material has been used since a long time, microleakage and post operative sensitivity have been strongly associated especially with class II restorations. Moreover, the use of liner also plays an important role in determining whether the tooth being treated may encounter any postoperative sensitivity (Opdam et al., 1998; Tekce et al., 2015). Cavity depth is also one the telling factors among the ones which cause postoperative sensitivity among composite restorations. Studies have reported that this sensitivity may not be directly related with the absence of liner, but the depth of cavity (M et al., 2001).

Previous studies have reported an incidence of post operative sensitivity among 30% of the patients after the placement of composite restorations. However, there are also some reports that this sensitivity tends to decrease with time (Opdam et al., 1998). Over the years, several studies have investigated the various causes associated with postoperative sensitivity ranging from type of cavity, depth, liner used and technique of the practitioner. However, the management of postoperative sensitivity still remains a question to be answered as the dental professionals have to judge the clinical condition of the restoration whether to redo the filling or leave it (Berkowitz et al., 2013).

Aims of the study
To determine the prevalence of post operative pain among the patients visiting REU
To determine the causative factors associated with post operative sensitivity

2. MATERIALS AND METHODS
The class II restorations were placed by dental interns and the procedure was carried out using carbide 330 burs, tofflemire matrix, and total etching technique with universal 3M bonding. The depth of the cavity was measured by the radiograph. This is an observational study, which was conducted among the patients visiting the REU clinics and ethical as well as clinical approval was taken. The ethical approval was taken form IRB, Riyadh Elm University with approval number FRP/2018/225. The duration of the study was from 20/09/2018 to 15/09/2019.

Inclusion criteria
Single tooth from each quadrant was included.
Age of the patient: 14 and above
Teeth selected: Permanent teeth with class II caries.

Exclusion criteria
Tooth with class I, III, IV, V and VI caries.
Any tooth with pulp exposure.
More than one tooth in same visit and quadrant were excluded.

Patients receiving composite class II restorations were contacted and followed up for the period of 1 month. Questions related to pain prevalence were asked on the intervals of 2 days, 1 week, 2 weeks and 4 weeks after the placement of restoration. Type of liner/base, depth of the cavity, history and pattern of pain were noted for each patient in order to compare the findings. Convenient sampling was taken place with 727 patients being approached and 700 taken as final study sample after their consent was achieved. Data was collected from November 4th 2018 to May 28th 2019 and later was analyzed using SPSS version 19, which included
descriptive as well as inferential statistics. Value of significance was kept under 0.05. Ethical approval was acquired from the Riyadh Elm University research center with registration number: FRP/2018/225 and IRB number: RC/IRB/2018/1179

3. RESULTS
A total of 727 patients (n= 343, 49% males and n=357, 51% females) were approached and out of these, 27 patients were excluded as they were unable to be followed up during the course of the study. Results were achieved by Chi-square test as well as descriptive statistics. Table 1 shows the pain prevalence in participants on the basis of their age and it can be observed that no significant comparisons were reported. Table 2 shows the difference in pain prevalence among males and females, which revealed no statistically significant comparison. Table 3 shows the similar description of pain prevalence during the course of 4 weeks on the basis of cavity depth. Once again, no statistical difference was observed when compared among 0.5mm, 1mm and 2mm. however, slight difference in pain prevalence was seen among patients with cavity depth of 2mm after 2 days of restoration placement. Similarly, table 4 shows the pain prevalence when compared on the basis of liner used. We found a statistically significant comparison when inquired about the pain prevalence after 4 weeks of restoration (p-value: 0.029). It can be noted that 26% patients with liner being placed reported pain as compared to 4% of patients with no liner. However, all other comparisons were not statistically significant.

Figure 1 shows the descriptive representation of pain characteristics after 2 days of restoration. It can be observed that the majority of study participants experienced sudden pain (40%) of short duration (66%) with less severity (60%) and only 16% having relieved by analgesics. Table 4 shows the descriptive representation of pain characteristics after 1 week of restoration. It can be observed that the majority of study participants experienced pain while eating (50%) of short duration (50%) with less severity (66%) and only 15% having relieved by analgesics. Figure 1 shows the descriptive representation of pain characteristics after 2 weeks of restoration. It can be observed that the majority of study participants experienced pain due to hot & cold (50%) of short duration (66%) with less severity (60%) and only 4% having relieved by analgesics. Table 4 shows the descriptive representation of pain characteristics after 4 weeks of restoration. It can be observed that the majority of study participants experienced pain due to hot & cold (50%) of short duration (66%) with less severity (66%) and only 4% having relieved by analgesics.

Table 1 Pain prevalence over the course of 4 weeks on the basis of age

<table>
<thead>
<tr>
<th>Age</th>
<th>Pain after 2 days</th>
<th>Pain after 1 week</th>
<th>Pain after 2 weeks</th>
<th>Pain after 4 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-20 years</td>
<td>Yes: 45% No: 55%</td>
<td>Yes: 22% No: 78%</td>
<td>Yes: 22% No: 78%</td>
<td>Yes: 11% No: 89%</td>
</tr>
<tr>
<td>21-30 years</td>
<td>Yes: 37% No: 63%</td>
<td>Yes: 11% No: 89%</td>
<td>Yes: 16% No: 84%</td>
<td>Yes: 16% No: 84%</td>
</tr>
<tr>
<td>31-40 years</td>
<td>Yes: 38% No: 62%</td>
<td>Yes: 13% No: 87%</td>
<td>Yes: 13% No: 87%</td>
<td>Yes: 0% No: 100%</td>
</tr>
<tr>
<td>41-50 years</td>
<td>Yes: 20% No: 80%</td>
<td>Yes: 20% No: 80%</td>
<td>Yes: 20% No: 80%</td>
<td>Yes: 20% No: 80%</td>
</tr>
<tr>
<td>51-65 years</td>
<td>Yes: 0% No: 100%</td>
<td>Yes: 0% No: 100%</td>
<td>Yes: 25% No: 75%</td>
<td>Yes: 25% No: 75%</td>
</tr>
<tr>
<td>P-value</td>
<td>.547</td>
<td>.815</td>
<td>.931</td>
<td>.730</td>
</tr>
</tbody>
</table>

Table 2 Pain prevalence over the course of 4 weeks on the basis of gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Pain after 2 days</th>
<th>Pain after 1 week</th>
<th>Pain after 2 weeks</th>
<th>Pain after 4 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>Yes: 41% No: 59%</td>
<td>Yes: 16% No: 84%</td>
<td>Yes: 16% No: 84%</td>
<td>Yes: 9% No: 91%</td>
</tr>
<tr>
<td>Female</td>
<td>Yes: 26% No: 74%</td>
<td>Yes: 16% No: 84%</td>
<td>Yes: 22% No: 78%</td>
<td>Yes: 17% No: 83%</td>
</tr>
<tr>
<td>P-value</td>
<td>0.353</td>
<td>1.000</td>
<td>0.699</td>
<td>0.665</td>
</tr>
</tbody>
</table>
4. DISCUSSION

This study was aimed to assess the prevalence and determine the factors associated with postoperative sensitivity among patients having composite restorations. Several factors were listed including depth of cavity and use of liner. A study conducted by Aushill et al. (2009) investigated the prevalence of postoperative sensitivity after 2 weeks of composite restorations. It was revealed that the cavity depth was significantly associated with postoperative sensitivity among the study participants. However, this was not the case with our study, as no significant relationship was discovered between the above mentioned factors (Berkowitz et al., 2009).

Another study carried out by Berkowitz et al. (2009) indicated a postoperative sensitivity among the study participants undergoing composite restorations after 1 week. The total number of patients having this problem was 52%, which is very high as compared to the number of patients having postoperative sensitivity after 1 week in our study (±10%) (Kaurani and Bhagwat, 2007). An investigation conducted by Kaurani & Bhagwat (2007) measured the amount of postoperative sensitivity after the use of liners below the composite restorations. It was revealed that the postoperative sensitivity was significantly reduced after the use of liners.

Table 3 Pain prevalence over the course of 4 weeks on the basis of cavity depth

<table>
<thead>
<tr>
<th>Cavity Depth</th>
<th>Pain after 2 days</th>
<th>Pain after 1 week</th>
<th>Pain after 2 weeks</th>
<th>Pain after 4 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 mm</td>
<td>Yes: 0% No: 100%</td>
<td>Yes: 0% No: 100%</td>
<td>Yes: 0% No: 100%</td>
<td>Yes: 0% No: 100%</td>
</tr>
<tr>
<td>1 mm</td>
<td>Yes: 31% No: 69%</td>
<td>Yes: 15% No: 85%</td>
<td>Yes: 23% No: 77%</td>
<td>Yes: 8% No: 92%</td>
</tr>
<tr>
<td>2 mm</td>
<td>Yes: 37% No: 63%</td>
<td>Yes: 13% No: 87%</td>
<td>Yes: 17% No: 83%</td>
<td>Yes: 17% No: 83%</td>
</tr>
<tr>
<td>P-value</td>
<td>0.552</td>
<td>0.837</td>
<td>0.702</td>
<td>0.621</td>
</tr>
</tbody>
</table>

Table 4 Pain prevalence over the course of 4 weeks on the basis of liner used

<table>
<thead>
<tr>
<th>Liner Used</th>
<th>Pain after 2 days</th>
<th>Pain after 1 week</th>
<th>Pain after 2 weeks</th>
<th>Pain after 4 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes: 42% No: 58%</td>
<td>Yes: 11% No: 89%</td>
<td>Yes: 21% No: 79%</td>
<td>Yes: 26% No: 74%</td>
</tr>
<tr>
<td>No</td>
<td>Yes: 27% No: 73%</td>
<td>Yes: 15% No: 85%</td>
<td>Yes: 15% No: 85%</td>
<td>Yes: 4% No: 96%</td>
</tr>
<tr>
<td>P-value</td>
<td>0.286</td>
<td>0.636</td>
<td>0.623</td>
<td>0.029</td>
</tr>
</tbody>
</table>

Figure 1 Pain characteristics at various time intervals of restoration

© 2020 Discovery Scientific Society. All Rights Reserved. www.discoveryjournals.org | OPEN ACCESS
However, our findings suggest that the use of liners increased the prevalence of pain among study subjects after 4 weeks of restorations (Gordan and Mjör, 2002).

Prevalence of postoperative sensitivity was also assessed by Gordon & Mjör in 2002. They evaluated the prevalence of pain after 1 week, 2 weeks, 1 month and 3 months. It was noted from the follow up that only 5% of the restorations caused postoperative sensitivity after 1 week. These findings are close to our results which as mentioned above is ±10% after 1 week. However, it is noticed that there were no cases with postoperative sensitivity after 2 weeks of restorations (Gordon & Mjör (2002). As far as our findings were concerned, around 17% of the patients reported postoperative pain (Bhatti, 2019).

We also measured the pain prevalence on the basis of cavity depth, with 37% of the subjects reporting postoperative pain with cavity depth of 2mm. A recent study conducted by Bhatti et al. (2014) revealed that 13% of the patients reported the prevalence of pain after 2 days of restoration, which is relatively lower than the one found in our study.

Study limitations and recommendations
This study can be improved by adding more data and variables to compare among each other. Secondly, follow up time can be increased from 1 month to 6 months as other similar studies have achieved much précised findings by doing so.

5. CONCLUSION
Postoperative sensitivity increased with the increase in cavity depth. Patients with liner used during their composite restorations reported more postoperative sensitivity as compared to patients without liner. The most common aggravating factor causing pain was found to be hot & cold. Majority of the participants experienced pain of short duration. Overall, the severity of pain was low.

Author contribution
All authors contributed equally for the research.

Conflict of Interest
The authors declare no conflict of interest.

Funding source
The research has not received any external funding.

Acknowledgement
We thank the patients who were all participated in and contributed samples to the study.

Informed consent
Written & Oral informed consent was obtained from all individual participants included in the study.

Data and materials availability
All data associated with this study are present in the paper.

REFERENCES AND NOTES
6. Diwaniyan, S., Sharma, K.K., Kuhad, R.C. Laccase from an alkalitolerant basidiomycetes Crinipellis sp. RCK-1:


Peer-review
External peer-review was done through double-blind method.

Article History
Received: 17 October 2020
Reviewed & Revised: 18/October/2020 to 20/November/2020
Accepted: 21 November 2020
E-publication: 29 November 2020
P-Publication: November - December 2020

Publication License
This work is licensed under a Creative Commons Attribution 4.0 International License.

General Note
We recommended authors to print article as color digital version in recycled paper. Discovery Scientific Society will not provide any prints for subscription.