



Frequency of Post-Operative Sensitivity in Class II Composite Restorations in Iranian Patients

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Academic Editors: Alessandro Leite Cavalcanti and Wilton Wilney Nascimento Padilha

Received: 27 January 2018 / Accepted: 10 May 2018 / Published: 21 May 2018

Abstract

Objective: To determine the frequency of sensitivity after treatment in composite resin restorations Class II of premolars in Iranian patients. **Material and Methods:** In this descriptive-cross-sectional study, questionnaires were used which included questions about the extent of post-operative sensitivity in posterior composite resin restorations among 178 patients referred to the restoration section. After restoration of the teeth, the patients were called to record sensitivity after the treatment. Post-operative sensitivity was measured 24 h and 1 month with cold stimulation using Visual Analog Scale (VAS) method. The data were analyzed with the SPSS software, through descriptive statistical methods (frequency and percentage, mean, standard deviation). Group comparisons were evaluated using Mann-Whitney U test and p-value <0.05 was considered to be statistically significant. **Results:** The mean frequency of sensitivity in terms of gender was 0.75 and 0.76 in males and females, respectively. The mean frequency of sensitivity in terms of type of jaw was 0.59 and 1.1, in the upper and lower jaw, respectively. It was also observed that the frequency of sensitivity is higher in adolescent age group, in comparison with other age groups. No significant association between gender as well as type of jaw and post-operative sensitivity frequency was observed ($p > 0.05$). However, age group has a statistically significant association with the frequency of post-operative sensitivity ($p < 0.05$). **Conclusion:** There is a significant relationship between extent of sensitivity after treatment in composite resin restorations Class II and the age group of patients.

Keywords: Dentistry, Operative; Composite Resins; Dentin Sensitivity.

Introduction

Today, with increased awareness, a special attention has been directed towards beauty, and as such application of tooth-colored materials, as effective factors in the beauty of smile, has increased considerably [1,2]. Various materials have been introduced regarding this spectrum including composite resin, whose application as restorer of posterior teeth has become the forefront of attention [1]. These materials have two major characteristics: first they are tooth colored and second they can be bonded to the tooth surface [3]. Furthermore, new studies have suggested successful results of application of resin composites in posterior teeth, which is due to optimization of the quality of composite resin materials and adhesive systems [2].

Based on these points, attachment of resin composites materials to the tooth structure in the long-term has always been a challenging issue and despite the rapid technological progress of resin and adhesive materials, contraction during polymerization and post-operative sensitivity are still challenging factors facing dentists. Clinical studies have demonstrated that around 30% of the studied population, after restoration with composite resin, have reported post-operative sensitivity [3].

In some cases, post-operative sensitivity may be solved over time, but in some cases, it remains permanent, causing failure of restoration. In several cases, clinicians hope that the symptoms improve without any clinical intervention. Nevertheless, this always jeopardizes long-term prognosis of restoration. Given that there is no evidence-based specific way, clinical judgment is based on subjective symptoms [4].

In a previous study, it was observed that incidence of post-operative sensitivity in the first 24 h after restoration is 4.9% in Class I, 13.5% in Class II Mesio-occlusal (MO) cavities, 16.4% in Class II Disto-occlusal (DO) cavities, and 26.2% in class II Mesio-occluso-distal (MOD) cavities. This was reported to be 4.2%, 9.6%, 9.1%, and 14.3% in Class I, II (MO, DO, and MOD), respectively after one week of treatment. The incidence of sensitivity after treatment and 30 and 90 days after restoration is trivial across all restored cavities [5].

Having searched scientific and information databases, it was observed that in spite of extensive studies on post-operative sensitivity in composite resin restorations in other countries, fewer studies were found to have examined post-operative sensitivity in composites restorations in Iran especially Tabriz. Accordingly, this research is designed and implemented to solve this information deficiency and investigate the frequency of post-operative sensitivity in composite resin restorations Class II of premolars in patients visiting the restoration section of Faculty of Dentistry, Tabriz, which is one of the important poles of dentistry in Iran.

Material and Methods

Sampling

In this study, to determine the sample volume, pilot study results were used, where in 10 cases of restoration, three post-operative sensitivity cases were evident. Considering $\alpha=0.05$ and

power of 80% and post-operative sensitivity frequency of 30%, the sample number was achieved as 180.

Data Collection

A total of 178 patients, of both genders, with premolar dental caries without any past history of sensitivity, for which the caries was not more than half of the path between dentin and pulp, were chosen. Patients consuming analgesics and those with a wide edentulous space, caries in adjacent teeth, and patients suffering from gum and periodontal diseases or systemic diseases such as xerostomia were excluded from the study.

Removal of carious tissue and composite resin restoration were performed by general senior dentistry students under the supervision in the operative and esthetic department of faculty of dentistry [3,5]. Post-operative sensitivity was measured 24 h and 1 month after composite resin restoration and with cold stimulation using Visual Analog Scale (VAS) method [5].

Regarding restoration of teeth, after removal of carious tissue, etching was performed for 20 s by phosphoric acid 38% (Etch-Rite, Pulpdent Corp., Watertown, USA). After washing and drying, the teeth were prepared for the next stage according to the manufacturer's instruction. At this stage, bonding (Excite, Ivoclar/Vivadent, Schaan, Liechtenstein) was smeared with etched enamel and dentin using micro brush and then scattered by air propiette for 2 s, and eventually curing was performed for 30 s. Then, the composite resin (Colten, Whaledent, Altstatten, Switzerland) was placed inside a 2 mm thick layer, and lighting was performed for 40 s. Additional layers through this method continued until cavity restoration was completed. Finally, the remnants of the restoration material were removed and polishing was performed.

Twenty-four hours and one month after restoration, cold test was performed using cold spray test by the unit operator (The intra-calibration was accepted when Kappa agreement was above 85%) and the patient was asked to record the extent of sensitivity in the cold test based on their own discretion using numbers between 1 and 10 based on visual analog scale (VAS). The patient was also trained on the manner of scoring given the explanation in Figure 1.

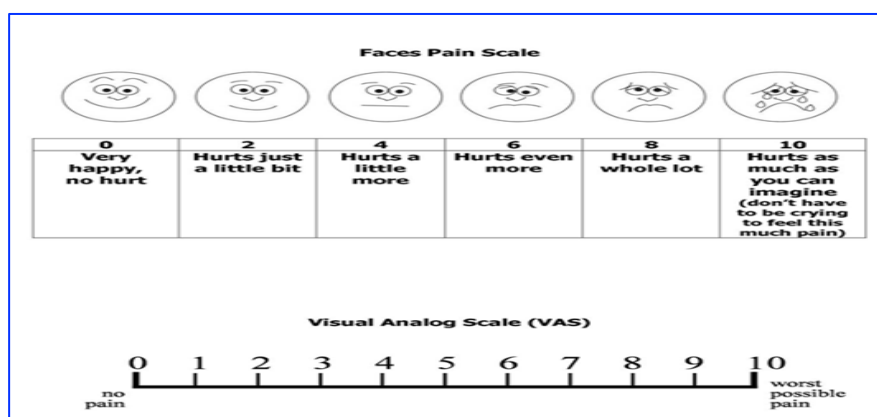


Figure 1. Visual and oral explanations of VAS test to the patients to record the extent of post-treatment sensitivity.

Data Analysis

The data were analyzed with the SPSS software (Chicago, IL, USA), version 16, through descriptive statistical methods (frequency and percentage, mean, standard deviation). In this study, group comparisons were evaluated using Mann-Whitney U test and p-value <0.05 was considered to be statistically significant.

Ethical Aspects

This research was regulated from the ethical declaration of Helsinki and was approved by the ethics and research committee at the Tabriz University of Medical Sciences. An informed consent was signed by all participants.

Results

The mean post-operative sensitivity after 24 h was 0.75 and 0.76 in males and females and 0.59 and 1.1 in the upper and lower jaws, respectively (Table 1). In addition, the frequency of post-operative sensitivity in the adolescent, young, adult, and elderly age groups was 2.43, 0.9, 0.48, and 0.89, respectively (Figure 2).

Table 1. The mean, standard deviation, maximum and minimum frequency of post-treatment sensitivity after 24 hours.

Variables	N	Mean and SD	Minimum	Maximum
Gender				
Male	60	0.75±1.77	0	8
Female	118	0.76±1.72	0	5
Jaw				
Upper	119	0.59±1.63	0	8
Lower	59	1.1±1.9	0	5
Age Group (Years Old)				
Teenage (<20)	14	2.43±2.31	0	5
Young (20-30)	52	0.9±1.83	0	6
Adult (30-50)	107	0.48±1.5	0	8
Elderly (>50)	5	0.89±0.89	0	2
Total	178	0.75±0.73	0	8

SD = Standard Deviation

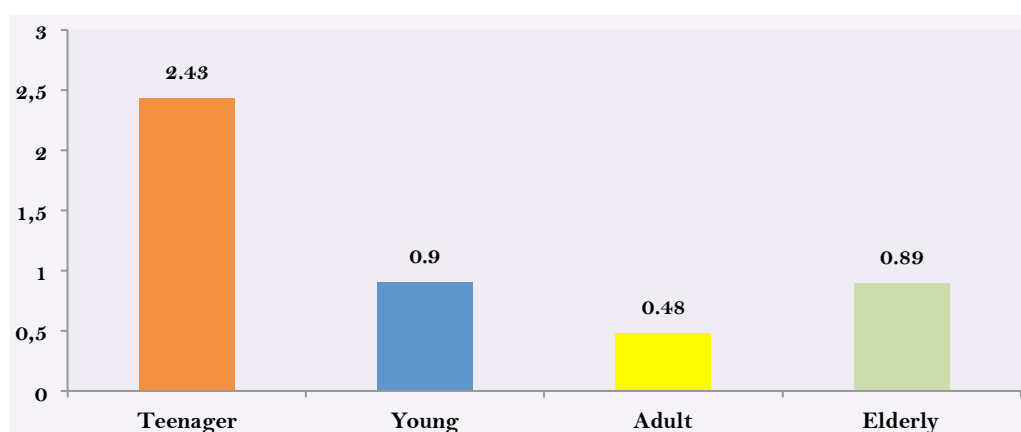


Figure 2. Distribution of patients according to the occurrence of sensitivity by age group.

Based on the means, it was observed that the extent of intensity of pain has been greater in the adolescent age group, when compared with other age groups. On the other hand, there was no significant difference between males and females, with intensity of pain being greater in the lower jaw than in the upper jaw.

The mean post-operative sensitivity after one month was 0.34 and 0.17 in males and females and 0.18 and 0.25 in the upper and lower jaws, respectively (Table 2). Furthermore, the frequency of post restoration sensitivity in the age groups of adolescent, young, adult, and elderly was 1.9, 0.19, 0.16, and 0.00, respectively. Based on the means, it was observed that the extent of pain intensity has been the greatest in the adolescent age groups, and there was no significant difference between males and females, with intensity of pain being greater in the lower jaw than in the upper jaw.

Table 2. The mean and standard deviation, maximum and minimum frequency of post-operative sensitivity after 1 month.

Variables	N	Mean and SD	Minimum	Maximum
Gender				
Male	60	0.34±1.18	0	5
Female	118	0.17±0.81	0	5
Jaw				
Upper	119	0.18±0.86	0	5
Lower	59	0.25±1.0	0	5
Age Group (Years Old)				
Teenage (<20)	14	1.9±0.84	0	5
Young (20-30)	52	0.19±0.84	0	5
Adult (30-50)	107	0.16±0.81	0	5
Elderly (>50)	5	0.0±0.0	0	5
Total	178	0.23±0.95	0	5

SD = Standard Deviation

Comparison of the mean of post-operative sensitivity in terms of gender and type of jaw indicated p-value was greater than 0.05, and thus there is no significant relationship between gender as well as type of jaw and post-operative sensitivity frequency. In addition, age group has a statistically significant association with the frequency of post-operative sensitivity ($p < 0.05$).

Discussion

Optical composite resins have transformed restorative dentistry. Due to increased awareness of patients about new dentistry treatments and the interest in tooth-colored dental restorations, these materials are among the most popular dental treatments among patients nowadays. New research suggests successful application and results of composite resins in posterior teeth, which is due to optimization of the quality of composite resin materials and adhesive systems [6].

Composite resins enjoy sufficient strength for restorations Class I and II. They are also insulator and do not require pulp protection with cavity preparation base. Over the past 20 years, the number of amalgam restorations has decreased by around 60% in the US [7]. Similarly, in Finland, 75% of posterior teeth are restored using composite resins [8].

Dental composite resins have solved a major part of problems associated with amalgam. Nevertheless, these materials have their own disadvantages, including tooth sensitivity to thermal changes, entrapment of food between the teeth, being time-consuming and costlier than amalgam and other occlusal wears [9].

Overall, posterior composite resin restorations are sensitive to techniques and thus every dentist may have a different performance in relation to these restorations, given their knowledge and experience [10]. However, the results of a study carried out in Brazil indicate that post-operative sensitivity in composite resins restorations Class II cannot be solved even by complete sterilization of the cavity and application of dentin anti-sensitivity material. Most probably, the reason for post-operative sensitivities is the input technique and the manner of preparation of cavities and restorations, rather than the type of materials used [11]. On the other hand, another study stated that there is no significant relationship between experience of the clinician and the technique of using adhesive material with micro leakage and post-operative sensitivity. Furthermore, in the above study, micro-leakage to the dentin and post-operative sensitivity were very trivial across all the evaluated total-etch systems [12]. A previous study showed that different connector systems had no difference in terms of post-operative sensitivity [3].

Some authors have investigated the probability and the risk of failure of posterior composite resin restorations with post-operative sensitivity symptoms and observed that in larger cavities with further occlusal contact, the probability of existence of post-operative sensitivity is higher [4]. A study in Japan also showed that with increased depth of cavities, post-operative sensitivity also increases and small and medium cavities had low post-operative sensitivity when compared with deep cavities [13].

In investigating post-operative sensitivity in posterior composite resin restorations in cavities Class II, it was observed that there is a significant difference in post-operative sensitivity in the first 24 h after treatment, with the extent of sensitivity diminishing over time [5]. A previous study has shown that 61% of the studied dentists had problem after performing posterior composite resin restorations. Other research has shown that only 6% of the restorations showed a primary sensitivity during 14 days [2]. In this study, in order to solve the above problems, individuals with the same skills were used and similar techniques were applied. Furthermore, the teeth selected for study had a medium caries depth.

Having investigated and searched studies in valid internal and external references, we observed that no comparison had been made between post-operative sensitivity and gender or age. However, in our study, these relations were examined and the results indicated that the extent of post-operative sensitivity is greater in younger age groups, when compared with adults and the elderly, which is most probably due to tertiary dentin over time. Moreover, the frequency of women was almost twice as large as that of men, and the extent of post-operative sensitivity had no relationship with gender.

Conclusion

The age group showed a statistically significant association with sensitivity frequency. However, no association between gender and type of jaw was observed with the occurrence of post-operative sensitivity.

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