

ORIGINAL RESEARCH

To assess effect of re-mineralizing agent on bond strength of resin composite to primary enamel

Nimrah Kawoos¹, Ayush Pokhriyal², Monika Varshney

¹Post graduate student, department of pedodontics, Seema dental college and hospital, Rishikesh, ²Private Practitioner, Rishikesh, ³MDS, Private Practitioner Haridwar

ABSTRACT:

Background: Successful endodontic treatment relies on effective cleaning and shaping of root canal as well as creation of an apical seal. The present study was conducted to assess effect of remineralizing agent on bond strength of resin composite to primary enamel. **Materials & Methods:** The present study was conducted on forty enamel specimens which were randomly distributed to 2 groups according to resin composite used. In all group, shear bond strength was measured at a crosshead speed of 0.5 mm/min and the type of bond failure was recorded. Voco Remin Pro was remineralizing agent used in the study. **Results:** In group I, Tetric N-Ceram and in group II, Z250 Universal Restorative was used. The mean bond strength in group I was 21.5 MPa and in group II was 10.6 MPa. The difference was significant ($P < 0.05$). **Conclusion:** Authors found that Tetric N-Ceram exhibited maximum bond strength as compared to Z250 Universal Restorative.

Key words: Tetric N-Ceram, Z250 Universal Restorative, Remineralizing

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Corresponding author: Dr. Nimrah Kawoos, post graduate student, department of pedodontics, Seema dental college and hospital, Rishikesh.

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INTRODUCTION

Successful endodontic treatment relies on effective cleaning and shaping of root canal as well as creation of an apical seal.¹ However, regardless of the materials and obturation techniques employed, root canal fillings exposed to saliva may become contaminated causing coronal leakage, which is a negative contributor to the prognosis of endodontic treatment.² Thus, even though apical leakage is still being considered as an important factor of endodontic failure, in the last few years, more focus has been given to procedures performed to achieve an effective coronal sealing soon after the completion of root canal filling.³

The immediate sealing of endodontically treated teeth using restorative materials is very important in preventing early coronal leakage and is associated with healthy apical tissues. Composite resin-based materials have been suggested for the restoration of nonvital teeth because of their benefits such as bonding to dentin by hybrid layer formation and reducing marginal leakage.⁴ Moreover, teeth restored with resin composite have been shown to

exhibit better fracture resistance than those restored with amalgam as the physico-mechanical properties of resin composites are closer to those of dentin.⁵ The present study was conducted to assess effect of remineralizing agent on bond strength of resin composite to primary enamel.

MATERIALS & METHODS

The present study was conducted in the department of Pedodontics. It comprised of forty enamel specimens which were randomly distributed to 2 groups according to resin composite used. Ethical clearance was obtained prior to the study.

In all group, shear bond strength was measured at a crosshead speed of 0.5 mm/min and the type of bond failure was recorded. Voco Remin Pro was remineralizing agent used in the study. P value less than 0.05 was considered significant. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of enamel specimens

Groups	Group I	Group II
Resin	Tetric N-Ceram	Z250 Universal Restorative
Specimen	20	20

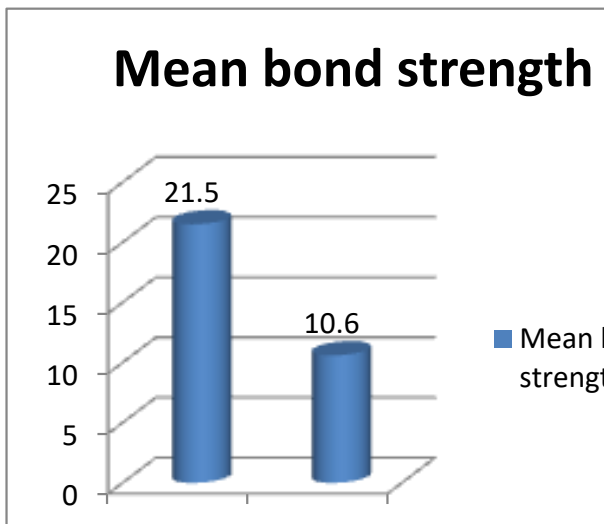
Table I shows that in group I, Tetric N-Ceram and in group II, Z250 Universal Restorative was used.

Table II Comparison of bond strength

Groups	Mean bond strength	P value
Group I	21.5	0.01
Group II	10.6	

Table II, graph I shows that mean bond strength in group I was 21.5 MPa and in group II was 10.6 MPa. The difference was significant ($P < 0.05$).

Graph I Comparison of bond strength



DISCUSSION

Dental resins containing calcium phosphate (CaP) filler particles were developed with remineralizing capabilities.⁶ The CaP particle sizes ranged from about 1 μm to 55 μm in traditional CaP-containing resins. These composites released supersaturating levels of calcium (Ca) and phosphate (P) ions and were shown to remineralize tooth lesions in vitro. One study showed that whisker-reinforced CaP composite, which was proposed for use in atraumatic restorative treatments (ART composite), remineralized natural dentin as well as dentin with artificial caries.⁷ To improve the load-bearing properties, a stronger barium-glass filler was also incorporated into a composite containing amorphous calcium phosphate (ACP), yielding improvement in flexural strength and elastic modulus, with no adverse influence on ion release profiles.^{8,9} The present study was conducted to assess effect of remineralizing agent on bond strength of resin composite to primary enamel. In this study, in group I, Tetric N-Ceram and in group II, Z250 Universal Restorative was used. We found that

mean bond strength in group I was 21.5 MPa and in group II was 10.6 MPa. The difference was significant ($P < 0.05$).

Abdemelid et al¹⁰ in their study assessed the effect of three remineralizing agents (Voco Remin Pro[®], Uncle Harry's remineralization kit, Sunshine remineralization gel) on the shear bond strengths of two resin-composites (Tetric[®] N-Ceram and Filtek[™] Z250 Universal Restorative) to enamel of primary molars. Ninety-six enamel specimens were prepared and randomly distributed to eight groups according to the control, remineralizing agents, and resin composite used. Shear bond strength was measured at a crosshead speed of 0.5 mm/min and the type of bond failure was recorded. The highest shear bond strength (Mean+SD) in MPa was for Tetric[®] N-Ceram/control [21.06+1.68] while the lowest was for Filtek[™] Z250/Sunshine remineralization gel [11.98+1.46]. Tukey HSD Post Hoc Tests showed significant difference between Tetric[®] N-Ceram/control and all other groups ($p=0.0001$) except Filtek[™] Z250/control. In addition, there was significant difference between Filtek[™] Z250/control and all other groups ($p=0.0001$) except Tetric[®] N-Ceram/control and Tetric[®] N-Ceram/Uncle Harry's remineralization kit. Mode of failure was cohesive (9.38%), adhesive (55.21%), and mixed (35.42%).

Van et al¹¹ examined the effect of different enamel and dentin conditioning times on the shear bond strength of a resin composite using etch-and-rinse and self-etch adhesive systems. Shear bond strengths were determined following treatment of flat ground human enamel and dentin surfaces (4000 grit) with 11 adhesive systems: 1) AdheSE One Viva Pen-(ASE), 2) Adper Prompt LPop-(PLP), 3) Adper Single Bond Plus-(SBP), 4) Clearfil SE Bond-(CSE), 5) Clearfil S3 Bond-(CS3), 6) OptiBond All-In-One-(OBA), 7) OptiBond Solo Plus-(OBS), 8) Peak SE-(PSE), 9) Xeno IV-(X4), 10) Xeno V-(X5) and 11) XP Bond-(XPB) using recommended treatment times and an extended treatment time of 60 seconds ($n=10/\text{group}$). Composite (Z100) to enamel and dentin bond strengths (24 hours) were determined using Ultradent fixtures and debonded with a crosshead speed of 1 mm/minute. The highest shear bond strengths (MPa) to enamel were achieved by the three etch-and-rinse systems at both the recommended treatment time (SBP-40.5 \pm 6.1; XPB-38.7 \pm 3.7; OBS- 35.2 \pm 6.2) and the extended treatment time (SBP-44.5 \pm 8.1; XPB-40.9 \pm 5.7; OBS-35.0 \pm 4.5). Extending the enamel treatment time did not produce a significant change ($p > 0.05$) in bond strength for the 11 adhesive systems tested.

CONCLUSION

Authors found that Tetric N-Ceram exhibited maximum bond strength as compared to Z250 Universal Restorative.

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