Research Studies on Pre-Heated Composite and How It Improves Outcomes – Summary List

The following is a list of articles demonstrating the advantages of preheating.

1.) 3M Blog: Five Reasons Why You Should Warm Your Composite - 3M Dental Blog

2.) Degree of Conversion: The Effect of Temperature on Composite Polymerization Stress and Degree of Conversion – *Fernando C. Calheiros, Marcia Daronch, Frederick A. Rueggeberg, Roberto R. Braga*
Clinical significance: Increasing composite temperature allows for reduced exposure duration and lower polymerization stress (both maximum and final) while maintaining or increasing degree of conversion.
https://addent.com/wp-content/uploads/2017/04/Effect-of-temperature-on-composite-polymerizationstress-and-degree-of-conversion-.pdf

3.) Shrinkage Force and Monomer Conversion: Pre-heating of high-viscosity bulk-fill resin composites: Effects on shrinkage force and monomer conversion. Journal of Dentistry – *Taubock Tobias T, Tarle Zrinka, Marovic Danijela, Attin Thomas*
Clinical significance: Composite pre-heating significantly reduces shrinkage force formation of high-viscosity bulk-fill and conventional resin composites while maintaining or increasing the degree of monomer conversion, dependent upon the specific composite material used.
https://addent.com/wp-content/uploads/2017/04/Pre-heating-of-high-viscosity-bulk-fill-composites_Effects-on-shrinkage-force-and-monomer-conversion-_-Taubock-Tobias-T_Tarle-Zrinka_Marovic-Danijela_Attin-Thomas.pdf

4.) Shrinkage: Influence of preheating of composites on voids, internal adaptation, and post-gel shrinkage strain using Nano CT analysis – *Dr. Rajaram, Dr. Deepak Mehta, Dr. N. Meena*
Summary and Conclusion: Pre-heated composites report an increased degree of conversion and reduced shrinkage force when cured for a shorter duration of time when compared to room-temperature composites cured for 20 seconds. Preheated composite resulted in fewer internal voids.
https://addent.com/wp-content/uploads/2023/06/Degree-of-Conversion-and-Nano-CT-Report_Rajaram_Mehta_Meena.pdf. Submitted for publication.

5.) Voids: Prewarming effect on adaptation, porosities, and strength of a composite resin. – *K.H. Bolding, A.E. Hill, D. Tantbirojn, A. Versluis*
Conclusion: Restorations made with a prewarmed composite had better adaptation and fewer large voids. Prewarmed composite that was cured in place attained higher diametral tensile strength than composite that was placed at room temperature, although the increase did not reach statistical significance across the interface of incrementally built specimens.
https://www.sciencedirect.com/science/article/abs/pii/S1751616123002667

6.) Microleakage: Effects of Pre-heating Resin Composite on Restoration Microleakage – *WC Wagner, MN Asku, AL Neme, JB Linger, FE Pink, S Walker*
Conclusion: The Preheated treatment resulted in significantly less microleakage at the cervical margin compared to the Control or the Flowable resin liner treatment. Preheating the composite was shown to be valuable in reducing microleakage in the more sensitive cervical margins.
https://addent.com/wp-content/uploads/2017/04/Effect-of-Pre-heating-Resin-Composite-on-Restoration-Microleakage_Wagner-Walker.pdf

7.) Color Stability: Color stability, opacity and degree of conversion of pre-heated composites – *Fabrício Mariano Mundim, Lucas da Fonseca Roberti Garcia, Diogo Rodrigues Cruvinel, Fabrício Augusto Lima, Luciano Bachmann, Fernanda de Carvalho Panzeri Pires-de-Souza*
Conclusions: Composite pre-heating does not promote changes in the optical properties despite the increase in the degree of conversion.
https://pubmed.ncbi.nlm.nih.gov/21163324/

8.) Effect on the Pulp: Effect of Pre-heated Composite on In-Vitro Intrapulpal Temperature Rise – *M. Daronch*
Conclusion: The use of preheated composite does not significantly increase intrapulpal temperature values when compared to that delivered at room temperature.
https://addent.com/wp-content/uploads/2017/04/EffectofPre-HeatedCompositeonIn-VitroIntrapulpal.pdf

9.) Marginal Adaptation: The Effect of Preheating and Flowable Composite on the Marginal Integrity of Class II Composite Restorations – *Yasmin A. Elkady, Ali I. Abdalla, and Mostafa M. Hasan*
Conclusion: Application of flowable composite as a liner in composite restorations cannot reduce microleakage but preheating the resin composite to elevated temperature, i.e. 60°C, increases the adaptation and lowers the gap at the restoration margin.
https://addent.com/wp-content/uploads/2022/04/The-Effect-of-Preheating-and-Flowable-Composite-on-the-Marginal-Integrity-of-Class-II-Composite-Restorations.pdf

10.) Water Absorption & Solubility: Temperature and Curing Time Affect Composite Sorption and Solubility - *Fabricio Luscino Alves de Castro, Bruno Barbosa Campos, Kely Firmino Bruno, Rogerio Vieira Reges*
Conclusion: In conclusion, higher temperatures or longer curing times led to lower sorption and solubility values for composite tested; however, this trend was only significant in specific combinations of temperature and curing times.
https://addent.com/wp-content/uploads/2017/04/Temp-Cure-Time-_-Sorption-Solubility.pdf

11.) Bonding and Adhesion: Effect of pre-cure temperature on bonding potential – *Amerigo Cantoro, Cecilia Goracci, Federica Papacchini, Claudia Mazzitelli, Giovanni Maria Fadda, Marco Ferrari*
Results: Pre-heating of PF to 60 ◦C resulted in a significant increase in bond strength (20.7 ± 9.4 MPa; $p < 0.05$).
Significance: Pre-heating to 60 ◦C enhances the bonding potential of PF.
https://addent.com/wp-content/uploads/2017/04/Effect-of-pre-cure-temperature-on-the-bonding-potential.pdf

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