

Evaluation of Wear Resistance of Modern Bulk Fill Materials

Abstract

Lead by Nathaniel Lawson, DMD, PhD, Director of Bio-Materials at the University of Alabama at Birmingham, this study evaluates the wear of 4 commercially available bulk fill composites, including Clinician's Choice® Evanesce® Bulk Cure™ using standardized methods to simulate clinical conditions.

The results indicate there was a statistically significant difference ($P < .001$) between the wear of the materials. Clinician's Choice Evanesce Bulk Cure demonstrated the least volumetric wear among the tested materials – validating superior wear resistance compared to the other materials. Evanesce Bulk Cure showed statistically similar performance to SDR® flow+ and significantly less wear than 3M® Filtek® Bulk Fill Flowable and Bulk EZ Plus®. These findings suggest Evanesce Bulk Cure may offer improved durability for dental restorations.

Introduction

Wear resistance is a critical property for restorative dental materials, as it impacts their longevity and performance under masticatory forces. Bulk fill composites have gained popularity due to their ease of placement and ability to cure in thicker layers, but their mechanical properties vary. This study aims to compare the wear resistance of four commercially available bulk fill composites, providing insights for clinicians seeking durable restorative solutions.

Bulk Fill Materials Evaluated:

- **Evanesce Bulk Cure** (Clinician's Choice)
- **SDR flow+** (Dentsply Sirona)
- **Bulk EZ Plus** (Zest Dental Solutions)
- **3M Filtek Bulk Fill Flowable** (Solventum)

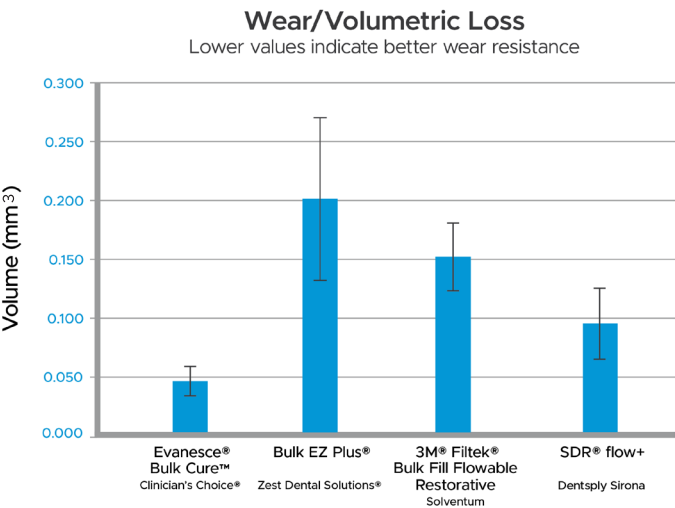
Study Design

Specimens (8 mm x 4 mm x 4 mm) were fabricated in silicone molds and cured incrementally where needed using an Elipar S10 curing light (≥ 1000 mW/cm²) for the manufacturer-specified time and wet-polished to 1200 grit using a polishing wheel to ensure uniformity. The specimens were then subjected to 400,000 cycles in a wear testing machine under a 35N load, agitated by zirconia balls (2.5 mm diameter) using a new ball for each test with a 33% glycerin solution applied, monitored and replenished daily to simulate saliva as the lubricant. The machine was set to slide a distance of 2 mm which was repeated 60 times per minute over 4 days and 15 hours. Following the agitation, specimens were scanned using a Keyence VHX 3D surface measurement system where wear volume was calculated by measuring material loss below a leveled plane.



Results

Analyzed using four one-way ANOVAs ($P<0,001$), the results revealed a significant difference among the volume wear of each material with Clinician's Choice Evanesce Bulk Cure exhibiting the least wear and was statistically similar to SDR flow+ but significantly outperformed 3M Filtek Bulk Fill Flowable and Bulk EZ Plus. Clinician's Choice Evanesce Bulk Cure showed superior wear performance, making it a reliable choice for applications requiring high durability such as a posterior restoration.



Lawson, N. University of Alabama, School of Dentistry. Wear of Bulk Fill Materials. December 2024.
Study based on 400,000 cycles.
Bulk EZ Plus® is a registered trademark owned by Zest IP Holdings, LLC. SDR® is a registered trademark owned by Dentsply Sirona, Inc. 3M® is a registered trademark owned by 3M Company. Filtek® is a registered trademark owned by Solventum Intellectual Properties Company.

Brand	Average Volume Loss (mm³)	Standard Deviation (mm³)
Evanesce Bulk Cure	0.045	0.014
SDR flow+	0.092	0.030
3M Filtek Bulk Fill Flowable	0.153	0.026
Bulk EZ Plus	0.201	0.068