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SHEAR BOND STRENGTH OF RMGICS: A COMPARATIVE STUDY

OBJECTIVES

To compare the shear bond strength of Riva Cem Automix, a new Resin-Modified Glass-Ionomer

Cement (RMGIC), to two market-leading products. The material substrates were selected based on their common usage in the fabrication of dental appliances used for indirect restorations.



EXPERIMENTAL METHODS

Three leading RMGICs were evaluated and compared: Riva Cem Automix (RCA) (SDI Ltd., Bayswater, Australia), RelyX[™] Luting Plus Automix (RLP) (3M, St Paul, MN, USA) and FujiCEM[™] 2 (FC2) (GC Corp., Tokyo, Japan).

Shear Bond Strengths (SBS) were evaluated according to ISO/FDIS-29022:2013(E) using an INSTRON#5942. Materials were dispensed according to manufacturer's instructions, with specimens stored in humidor (37°C, 1h) before demolding and immersion in deionised water at 37°C 23h before testing.

Data were analysed using unpaired t-test with a significant difference of p<0.05.

RESULTS AND DISCUSSION

RMGICs luting cements are self-curing, radiopaque paste/paste luting materials with high fluoride release, low-film thickness and excellent marginal integrity. It is indicated for a myriad of indirect restorations, including inlays, onlays, crowns and bridges, from a range of diverse materials such as base- and noble-metals, lithium disilicate, feldspathic ceramics and zirconia. Within the limitations of this study, Riva Cem Automix (RCA) demonstrated significantly higher shear bond strength on Noble Metal (Argenco 68) when compared to the market-leading RMGICs. Shear bond strength of the RMGICs to all other substrates showed no statistical difference between the products tested.



Substrate	THINGIC .		
	Shear Bond Strength (MPa, ±SD)		
	RCA	RLP	FC2
Dentin	12.02 ±2.89 ^a	9.08 ±3.82 ^a	12.72 ±2.94 ^a
Enamel	10.54 ± 4.36^{b}	10.04 ±3.59 ^b	13.04 ±3.38 ^b
Base Metal (Rexillium)	4.73 ±1.12 ^c	6.02 ±1.23 ^c	6.05 ±1.90 ^c
Noble Metal (Argenco 68)	8.31 ±0.83 ^d	2.81 ±1.18 ^e	3.42 ±2.20 ^e
High strength Ceramics (IPS e.max CAD; Glass Ceramics with lithium disilicate)	11.82 ±5.43 ^h	11.44 ± 2.60^{h}	14.06 ±4.90 ^h
High strength Ceramics (Lava Zirconia; Glass free Ceramics)	11.74 ± 3.34^{i}	9.96 ± 1.53^{i}	11.01 ± 1.76^{i}
Low strength Ceramics (Vitablock Mark II; Glass Ceramic – Feldspar)	6.18 ± 2.26^{j}	4.48 ± 2.08^{j}	4.66 ± 1.51^{j}

*Means with the same letters are not statistically different (p<0.05, n=5)



Bonding on High Stength Ceramics

Bonding on Base Metal



Bonding on High Stength Ceramics (glass free Ceramics) Bonding on Noble Metal



Bonding on Low Strength Ceramix



Bonding on Dentin



CONCLUSION

Riva Cem Automix performed as well or better than the market-leading RMGICs tested when evaluated for shear bond strength to a range of common dental

substrates. This provides support for the use of the Riva Cem Automix in clinical situations.

REFERENCES

¹International Organization for Standardization. Dentistry – Adhesion – Notched - Edge Shear Bond Strength Test; 29022:2013; ISO: Geneva, Switzerland, 2013. ²Maño, E.P., et al., In vitro bonding performance of modern self-adhesive resin cements and conventional resin-modified glass ionomer cements to prosthetic substrates. Applied Sciences, 2020; 10(22), 8157.