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## The effects of erroneous mixing of zinc carboxylate cements.

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### **Abstract**

The mechanical properties of luting agents are determined by the mixing ratio of powder and liquid. The purpose of this in vitro study was to evaluate the therapeutic range of zinc carboxylate cements by investigating the mechanical properties of such cements when formulated using erroneous powder/liquid ratios. Using the recommended powder/liquid ratio as a standard, four different mixing ratios (25% and 50% more or less powder) were used to prepare each carboxylate cement (Aqualox, Carboco, Durelon). A veneering composite (Sinfony) was used as control. Vickers hardness and three-body abrasion were evaluated. In each carboxylate cement, both a 25% and 50% increase in liquid content resulted in significantly lower Vickers hardness, whereas a higher powder content altered the saturation concentration but did not result in increased hardness; this effect was particularly obvious in Carboco. Durelon showed a linear relationship between wear and powder/liquid ratio, whereas Carboco and Aqualox displayed a more exponential increase in wear in mixings with an increased liquid content. The mechanical properties of carboxylate cements were altered in mixtures with an increased liquid content, but not in those with a high powder content. Mixing ratio errors greater than 25% may significantly affect the clinical performance of carboxylate cements.