

عنوان مقاله:

Evaluating the Physical Properties of Novel Zinc Phosphate and Zinc Polycarboxylate Cements Containing Zinc Oxide Nanoparticles

محل انتشار:

مجله تحقیقات دندانپزشکی، دوره 9، شماره 3 (سال: 1396)

تعداد صفحات اصل مقاله: 6

نویسندگان:

Mohammad Ali Hemmati

Faeze Hamze

Mostafa Fatemi

Farhood Najafi

Mohammad Bagher Rezvani

خلاصه مقاله:

Background: Zinc oxide (ZnO) that is a main component of Zinc Polycarboxylate and Zinc Phosphate conventional cements has been incorporated into many dental materials for mechanical enhancement. Moreover, by decreasing the particle size of ZnO down to nano-scale, its beneficial effects would tremendously increase because the nanoparticles have considerably higher surface to volume ratio compared to micro-particles. Objectives: The aim of this study was to assess mechanical, physical, and chemical properties of Zinc Polycarboxylate and Zinc Phosphate cements containing Zinc oxide nanoparticles. Methods: Three powder formulations were prepared for either of the cements based on the nanoparticles content (0 wt%, 10 wt% before, and 10 wt% after sintering the powder). The prepared groups were compared with each other in terms of their compressive strength, setting time, film thickness, and acid erosion resistance using one way ANOVA and Tukey HSD statistical tests ($\alpha = 0.05$). Results: Incorporating zinc oxide nanoparticles did not significantly change neither the film thickness nor the acid erosion resistance of the cements ($P > 0.05$). Nevertheless, the setting time of zinc phosphate significantly decreased by adding nanoparticles ($P < 0.05$) while there was no statistical difference in zinc polycarboxylate groups ($P > 0.05$). On the other hand, although incorporating nanoparticles significantly reduced the compressive strength of zinc phosphate ($P < 0.05$), it was noticeably improved in zinc polycarboxylate groups ($P < 0.05$). Conclusions: By incorporating 10 wt% of nano zinc oxide into zinc phosphate and zinc polycarboxylate cements, their compressive strength are more affected rather than their setting time, film thickness, and acid erosion resistance

کلمات کلیدی:

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