
Original Article

Advanced analytical tests and acellular bioactivity of zinc oxide eugenol sealer following the addition of nanohydroxyapatite-tyrosine amino acid: An *in vitro* study

ABSTRACT:

Aim: The aim is to develop a zinc oxide eugenol root canal sealer with modified properties by utilizing nanohydroxyapatite (nHAP)-tyrosine amino acid powders at varying concentrations ranging from 10% to 20%.

Methods: Five samples for each freshly mixed original zinc oxide-eugenol (ZOE) sealer and the experimental sealer at different concentrations were prepared. The additions were developed according to a predetermined equation. First, measure the setting time for each sample depending on the ADA specification no. 57. After immersing the original ZOE with selective concentrations of experimental sealer (10%, 12%, 16%, and 20%) samples in a 10 ml phosphate-buffered saline-containing container, changed every 3 days, and incubated for 28 days at 37° C and 95% relative humidity. A 10% nHAP-tyrosine amino acid powder containing nanoparticles produced the surface roughness of the test material, but this roughness increased with increasing the concentrations of additional material. This is accompanied by a decrease in grain size and an increase in cluster formation. Concentrations have increased by 10%–20%. After an incubation period, the characterized features of the experimental material were examined with atomic force microscopy, X-ray diffraction, and field emission scanning electron microscopy.

Results: All experimental groups displayed marked surface roughness, starting in the 10% group which increased with the concentration. Still, a markable increase was noticed particularly in the 20% group which had noticeably displayed more rough surfaces and structural changes compared to other percentages.

Conclusion: Adding (10%, 12%, 16%, and 20%) nHAP-tyrosine amino acid powders to an experimental zinc oxide eugenol sealer enhanced its bioactive properties, while the grain size was reduced. Although the concentrations of these components increased, increasing cluster formation of nanoparticles also occurred, more research is required to verify their clinical potential.