PVA-NaCMC-propolis hydrogels for burn healing applications

Oliveira, R.N.(1); Mancini, M.C.(1); Thiré, R.M.S.M.(2); McGuinness, G.B.(3);
(1) UFRRJ; (2) UFRJ; (3) DCU;

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Resumo:
Hydrogels are materials applied in burn healing since they keep wounds moisturized, promoting the healing, and they can be transparent, allowing the healing process to be monitored. PVA hydrogels present the above characteristics, although they do not present antimicrobial properties. Propolis is an antimicrobial agent rich in phenols and flavonoids, the main active compounds. NaCMC is a biocompatible polymer which could increase the gels water uptake. The aim of this study was the development and characterization of PVA-NaCMC-propolis gels. PVA (Sigma-Aldrich), NaCMC (Sigma-Aldrich) and a Brazilian propolis extract (Uniflora®) were used. The samples (10% w/v polymers and 0-30% v/v propolis) were prepared by freeze-thawing. The samples equilibrium swelling degree (ESD) and gel fraction (GF) were analyzed in PBS for 4 days. The DSC analysis indicated the samples thermal properties (heating rate of 10°C/min, from room temperature to 250°C), as well as their degree of crystallinity (Xc). The antioxidant activity of the samples was assessed by DPPH assay. All gels swelled more than 200% and they reached the ESD in 24h. The PVA-NaCMC gels swelled significantly more than PVA matrices and gels with 30% of propolis swelled significantly less than the others (p < 0.05). The GF was high in samples with no/low amounts of propolis, ~81%, and it diminished with the increase of the amount of propolis (p < 0.05). The propolis could be chemically bonded to the polymers or located between chains, inhibiting the chains packing. In addition, gels with high amounts of propolis could be less mechanical resistant. However, the antioxidant activity increased with the amount of propolis (and by the presence of NaCMC) in the samples. The presence of propolis interfered with the PVA crystallization and samples with the highest amounts of propolis presented the lowest Xc and GF. All samples presented suitable swelling properties in PBS and antioxidant activity for burn dressing applications.