Acorn–Derived Hydrogel for Antifungal Treatment

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The healthcare and pharmaceutical sectors play a critical role in combating various diseases affecting human and societal life. One of the diseases affecting many people today is tinea skin infections. In this study, acorn cellulose/K-carrageenan/kaolin hydrogel wound dressing materials were prepared that meet almost all the expected properties of an ideal hydrogel wound dressing with potential for use in the treatment of tinea skin infections. For hydrogels synthesized with different kaolin concentrations, FTIR (Fourier Transform Infrared Spectrophotometer), SEM (Scanning Electron Microscopy), TEM (Transmission Electron Microscopy), DSC (Differential Scanning Calorimetry), TGA (Thermal Gravimetric Analysis), mechanical analysis, contact angle, opacity, swelling behavior, antifungal analysis, drug loading and release studies were performed. The analyses revealed that high-purity cellulose was obtained from acorns and that the hydrogel materials were successfully synthesized. Among the hydrogels synthesized using different kaolin concentrations, the cellulose/?-carrageenan/5% kaolin hydrogel was determined to be the most optimal hydrogel material, exhibiting high mechanical strength, high thermal stability, maximum antifungal activity, and controlled drug release capability. The use of natural polymers as raw materials, along with the synthesis of cellulose from oak acorns (a waste product), resulted in a sustainable and environmentally friendly material. The experimental results demonstrated that hydrogels with suitable mechanical and thermal resistance, capable of successfully delivering controlled release of oxiconazole nitrate (OXI) for use in tinea treatment, have great potential for wound care applications.

Awards Won:
Second Award of $2,400