

NON-ANTIBIOTIC THERAPY AGAINST MULTIDRUG-RESISTANT BACTERIA ASSOCIATED TO SKIN INFECTIONS VIA ALGINATE/TOFU-BASED HYDROGEL ENRICHED WITH OZONIZED OIL.

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RESUMO

Introduction: The global rise of multidrug-resistant skin infections in human and domestic animals is challenging. Sodium alginate (SA) is a polymer obtained from algae that provides flexibility and durability to hydrogels. Alginate-based hydrogels, often used as drug carriers, are highly biocompatible and biodegradable. Tofu is an antioxidant protein derived from soy milk rich in minerals and vitamins. Ozonated sunflower oil has been successfully used in the treatment of skin infected disorders. Therefore, the goal of the present study was to evaluate the antimicrobial action of three formulations of SA/tofu hydrogel enriched with ozonized oil against multidrug-resistant bacteria. **Material and Methods:** Three increasing volumes of ozonized sunflower oil were incorporated into the liquid form of AS/tofu hydrogel (O₃-1, O₃-2 and O₃-3 AS/tofu groups). Non-ozonized AS/tofu hydrogel and 50% chlorhexidine were used, respectively, as negative and positive controls. Ozonized and non-ozonized hydrogels were tested against sensitive bacteria (*Staphylococcus aureus*, *S. epidermidis*, *Streptococcus pyogenes*, *Escherichia coli*) and multidrug bacteria (MD *S. aureus*, MD *S. epidermidis*, MD *E. coli* and MD *Pseudomonas aeruginosa*). The antimicrobial susceptibility testing (AST) was performed using the disk diffusion method. Paper disks saturated with the hydrogels were placed on a lawn of bacteria seeded on the surface of the medium. The presence of inhibition zone around the disk 24h after incubation indicated the antimicrobial activity of the hydrogel. In addition, the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (CBM) of the hydrogels against each pathogen were determined. A total of 12 serial dilutions (0.08 to 100%) were used to complete the MIC and CBM assays. **Results:** Inhibition zones were visualized around the disc soaked with chlorhexidine (positive control) and all ozonized AS/tofu hydrogels (O₃-1, O₃-2 and O₃-3). Only the non-ozonized AS/tofu hydrogel did not show antimicrobial action. The MIC and MBC of O₃-1, O₃-2 and O₃-3 groups were inversely proportional to their ozone enrichment (the higher the concentration of ozonized oil, the lower the MIC and CBM). Even the SA/tofu hydrogel with the lowest concentration of ozone oil (O₃-1) had a MIC and CMB ≤50% against the multidrug-resistant bacteria. Independently of the pathogen, non-ozonized SA/tofu hydrogel had MIC and CBM >100%. **Conclusion:** The three formulations of alginate/tofu-based hydrogel enriched with ozonized sunflower oil showed bactericidal action against sensitive and multidrug-resistant bacteria associated with skin infections.

PALAVRAS-CHAVE: antimicrobial, biomaterial, integrative medicine, one health, polymer

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