Synergistic Antimicrobial Activity of Manuka Honey and Silver Nitrate

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Antibiotic resistance is a significant problem in contemporary medicine. Drug-resistant microbial strains limit the number of treatments available to patients, which has led to a push for new antibiotic therapies. Traditional topical antibacterial agents such as honey and silver are once again gaining favor due to their low propensity to induce microbial resistance and effectiveness in treating infected wounds. This research investigates synergistic combinations of manuka honey (MH) and aqueous silver cations (Ag+) that could act as a new antimicrobial treatment with increased effectiveness and a broad spectrum of activity against many different types of bacteria. E. coli K-12 W1485, which closely mimics the behavior of pathogenic O157-H7, was cultured in broth and subjected to broth dilution susceptibility testing to determine minimum inhibitory concentrations (MIC) of MH and Ag+. To investigate synergistic interaction between MH and Ag+ against E. coli, a 96-wellplate checkerboard was created with 2.5-160μM $AgNO_3$ and 0-20% MH. The MICs were observed as the lowest concentrations that lacked visible growth, which was confirmed via OD650. Samples from the wells that inhibited bacterial growth were then plated and checked for visible growth after 24 hours to look for synergistic bactericidal activity. The combination index was calculated as 0.75, indicating synergistic growth inhibition. Cytotoxicity studies using human epidermal keratinocytes (HEKa), a MTS cell proliferation assay, and microscopy will be conducted to confirm that MH/Ag+ is not harmful to normal skin cells. Combined results will demonstrate that a MH/Ag+ regimen will be effective as an antimicrobial treatment for infected wounds.

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