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Phytochemicals and synergistic combinations as therapeutics against Staphylococcus epidermidis

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Staphylococcus epidermidis, coagulase-negative Staphylococcus, has recently emerged as the most frequent nosocomial pathogen infecting immunocompromized patients carrying medical devices and also a common cause of surgical wound infections and bacteremia. The main manifestation of the infection has been linked to highly structured biofilms formed by *S. epidermidis* on artificial surfaces. The present treatment relies upon use of antibiotics but it has been demonstrated that biofilm cultures are much more resistant than planktonic cultures. There is an urgent need for new antimicrobials and new strategies to address these issues. Moreover, the phytochemicals as synergistic combination against bacteria have shown less toxicity and limited chance for development of resistance due to diverse mechanism of action. The study was undertaken to determine the synergistic antimicrobial potential of phytochemicals curcumin and cinnamaldehyde in combination with other phytochemicals: green tea catechins, eugenol, thymol and ellagic acid against *S. epidermidis*. *S. epidermidis* was found to be more sensitive to cinnamaldehyde in combination with curcumin and also with thymol. Time kill kinetics was performed to establish the synergy between curcumin and cinnamaldehyde. The antibiofilm effect of synergistic combinations were studied and found to be effective in inhibiting the formation of *S. epidermidis* biofilm. One of the mechanisms for killing the bacteria was found to be disrupting the membrane by permeability studies on Escherichia coli ML-35p. Moreover the cellular cytotoxicity of synergistic combination was determined on vero cell line by MTT assay.

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