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Chemical Characterization and Time-Kill Effect of Crude Extracts of Propolis

Authors : I.K.Bedaida, A.Reguig

Abstract : Propolis is a complex resinous hive product, collected by bees from plants sources. Its chemical and constituents composition depends on its floral origin, and varies according to climatic and geographical conditions. Its strong antibacterial activity was correlated to the highest concentration of phenols. Staphylococcus aureus is the most significant human pathogen often carried asymptomatically on the bodies of both humans and animals, and has been implicated as causing severe morbidity and mortality worldwide. S. aureus has the ability to produce several exoenzymes that contribute to virulence such as coagulase, hemolysin, protease, and lipase and enterotoxin. It is considered also as one of the most important food safety concerns for the food industry. The aim of the study was to analyze propolis extracts' phytochemical and to study the cytoplasmic membrane damage of crude ethanol extract of propolis against Staphylococcus aureus ATCC 25923 by observing the changes of cell microstructure using scanning electron microscope and cell permeability damages. Propolis Ethanolic extract was analyzed by ultra-high-performance liquid chromatography coupled with a diode array detector and an electrospray mass spectrometer (UHPLC-DAD-ESI/MS). Additionally, polyphenols and volatile compounds of EEP was analyzed by gas chromatography–mass spectrometry GC-MS. Staphylococcus aureus ATCC 25923 was subjected to agar dilution method to determine the minimum inhibitory concentration (MIC) and potassium and protein leakages were performed to detect permeability damages. The results showed that the minimum inhibitory concentration (MIC) of EEP against Staphylococcus aureus ATCC 25923 was 39 µg/ml. Adding EEP at MIC level, there were obvious changes in the morphology of bacteria cells indicating cell damage. When EEP were added at (2MIC) levels, the cells were destroyed. EEP cause rapid increase the concentration of proteins and potassium in cell suspension.

Keywords : antimicrobial, GC-MS, HPLC, propolis, time kill effect
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