# OPROSPECTION OF ANTIBACTERIAL ACTIVITIES OF CINNAMON AND CLOVE CRUDE EXTRACTS AND ESSENTIAL OILS AGAINST BACTERIA ISOLATED FROM INFECTED SURGICAL SITES

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## ABSTRACT

ıtibiotic resistance especially in surgical treatments is a major global health threat. This calls for gency in investigating sustainable antibacterial agents from alternative sources. This study vestigated the antibacterial activity of *Cinnamomum cassia* (cinnamon) and *Syzygium aromaticum* love) crude extracts and essential oils against bacteria isolated from infected surgical sites. Eight ound swab samples were obtained from patients clinically diagnosed with surgical site infection ıd cultured on nutrient agar plates using standard isolation procedures. Bacterial isolates were lentified via morphological, biochemical and molecular methods. Essential oils (EOs) and extracts f cinnamon and clove were obtained via hydrodistillation and maceration, respectively. Antibiotic ensitivity test of the isolates against six classes of antibiotics was carried out using Kirby Bauer's isc diffusion method. Sensitivity of the isolates to the EOs, extracts as well as their combinations ere determined using agar well diffusion method. Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) of the essential oils, extracts and their combinations gainst the isolates were determined using double-fold dilution method. Rate of kill of the EOs and extracts against most susceptible isolates was evaluated. Phytochemical properties of the essential oils and extracts were evaluated using Gas Chromatography and Mass Spectrometry. *In silico* study was carried out on the bioactive compounds of the EOs and extracts using iGEMDOCK and SWISS-ADME. Bacteria isolated include *Escherichia coli* (20%), *Proteus vulgaris* (10%), *Staphylococcus epidermidis* (20%), *Moraxella catarrhalis* (10%), *Proteus mirabilis* (10%), *Vibrio parahemolyticus* 10%), *Klebsiella aerogenes* (10%), *Klebsiella quasipneumoniae* subsp. *similipneumoniae* (10%) ınd *Staphylococcus saprophyticus* (10%). Antibiotic sensitivity test revealed all isolates to be nultidrug-resistant. All isolates demonstrated susceptibility to the EOs and extracts, with zones of nhibition ranging from 17.0±0.0 mm to 50.0±2.3 mm for cinnamon EOs and extracts, 10.0±0.0 mm

22.0±0.3 mm for clove EOs and extracts and 6.0±0.1 mm to 69.0±0.7 mm for the combinations. e MIC and MBC of the EOs, extracts and their combinations ranged from 0.0977% v/v to 50% / and 0.0977% v/v to 100% v/v respectively, with the combinations exhibiting higher MIC and BC. Interactions between the combined EOs and extracts also revealed no synergistic effects. A cline in number of viable cells was observed across the EOs and extracts against selected isolates. ssential oil and methanol extract of cinnamon exhibited total kill of *S. saprophyticus* and *K. rogenes,* respectively while clove EO and ethyl acetate extract exhibited total kill against *E. coli* id *P. mirabilis,* respectively. Gas Chromatography and Mass Spectrometry of the EOs and extracts evealed presence of various bioactive compounds. Molecular docking revealed eugenol, methyl nnamate, 9-octadecanoic acid and p-vinylbenzohydrazaide as most active compounds. All ioactive compounds of the EOs and extracts demonstrated good oral bioavailability. Most bioactive omponents exhibited druggable pharmacokinetic properties. The study revealed that the bioactive omponents of cinnamon and clove are potential lead compounds in the development of efficient ntibiotics in treatment of surgical site infections.