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Non-Steroidal Anti-inflammatory Drugs, Plant Extracts, and Characterized Microparticles to Modulate Antimicrobial Resistance of Epidemic Meca Positive S. Aureus of Dairy Origin

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Abstract : The current study focused on resistance modulation of dairy linked epidemic mec A positive S. aureus for resistance modulation by plant extract (Eucalyptus globolus, Calotropis procera), NSAIDs, and star like microparticles. Zinc oxide {ZnO}c and {Zn $(OH)_2$} microparticles were synthesized by solvothermal method and characterized by calcination, X-ray diffraction (XRD), and scanning electron microscope (SEM). Plant extracts were prepared by the Soxhlet extraction method. The study found 34% of subclinical samples (n=200) positive for S. aureus from dairy milk having significant ($p < 0.05$) association of assumed risk factors with pathogen. The antimicrobial assay showed 55, 42, 41, and 41% of S. aureus resistant to oxacillin, ciprofloxacin, streptomycin, and enoxacin. Amoxicillin showed the highest percentage of increase in zone of inhibitions (ZOI) at 100mg of Calotropis procera extract (31.29%) followed by 1mg/mL (28.91%) and 10mg/mL (21.68%) of Eucalyptus globolus. Amoxicillin increased ZOI by 42.85, 37.32, 29.05, and 22.78% in combination with 500 ug/ml with each of diclofenac, aspirin, ibuprofen, and meloxicam, respectively. Fractional inhibitory concentration indices (FICIs) showed synergism of amoxicillin with diclofenac and aspirin and indifferent synergy with ibuprofen and meloxicam. The preliminary in vitro finding of combination of microparticles with amoxicillin proved to be synergistic, giving rise to 26.74% and 14.85% increase in ZOI of amoxicillin in combination with zinc oxide and zinc hydroxide, respectively. The modulated antimicrobial resistance incurred by NSAIDs, plant extracts, and microparticles against pathogenic S. aureus invite immediate attention to probe alternative antimicrobial sources.

Keywords : antimicrobial resistance, dairy milk, nanoparticles, NSIDs, plant extracts, resistance modulation, S. aureus
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