Synergistic effect of commercial mangosteen extract (Garcinia mangostana L.) and amoxicillin against methicillin-resistant Staphylococcus aureus (MRSA)

ABSTRACT

Antibiotic resistance occurs worldwide and has become a threat to humankind. Previous data have shown that antimicrobial resistance is a global issue demanding immediate resolution because it threatens the environment and society. The present work thus investigated the synergistic effects of commercial Garcinia mangostana L. (GML) extract and amoxicillin on the growth of methicillin-resistant Staphylococcus aureus (MRSA) bacterial cells. A commercial GML extract was screened for phytochemical properties, and the presence of α-mangostin was detected using high-performance liquid chromatography (HPLC). The antibacterial activity of the commercial GML extract with amoxicillin was analysed by minimum inhibitory concentration (MIC) and checkerboard assays. The morphology ultrastructure of bacteria was observed using transmission electron microscopy (TEM), after treatment with commercial GML extract, either single or in combination with amoxicillin. The MICs of amoxicillin and commercial GML extract against MRSA bacteria were 250.00 and 137.50 µg/mL, respectively. The checkerboard assay showed synergistic activity in the combination of commercial GML extract (34.38 µg/mL) and amoxicillin (62.50 µg/mL) at fractional inhibitory concentration (FIC) index of < 0.5. Damage to the structure of bacteria occurred due to the commercial GML extract plus amoxicillin. It was observed that the loss of bacterial cell membranes led to an irregular bacterial structure. These findings provided evidence that the combination of commercial GML extract and amoxicillin could reverse bacterial resistance in order to determine the susceptibility of traditional drugs.