Membrane-active antibacterial compounds in methanolic extracts of Jatropha curcas and their mode of action against Staphylococcus aureus S1434 and Escherichia coli E216

ABSTRACT

This research presents the antibacterial potential and mode of action of related active compounds of kernel meal, leaves, stem bark, root bark and root wood extracts of Jatropha curcas Linn. plant on Staphylococcus aureus S1434 and Escherichia coli E216. At double MIC (minimum inhibitory concentration) value, cell viability of S. aureus S1434 was inhibited by all extracts, but only kernel meal and root wood extracts inhibited E. coli E216. At half MIC, the ε24 (decrease in cell viability after 24h) for S. aureus S1434 was 69 and 66%, while that of E. coli E216 were 44 and 42% in the presence of kernel meal and leaves extract, respectively. However at double MIC, less than 5% of viable cells of S. aureus S1434 were detected in the leaves and root bark extracts after 5h. Conversely, less than 5% of the viable cells of E. coli E216 were detected in the presence of kernel meal and root wood extract after 7.5h. Loss of 260nm absorbing compounds and proteins from bacterial cells was directly proportional to the time of exposure of cells to the extracts. All extracts caused bacterial cells to lose their ability to tolerate salt (NaCl) at double MIC value. The loss of 260nm absorbing compounds, proteins and the loss of tolerance to NaCl suggest that leaves, root bark and kernel meal damaged the bacterial cell membrane. The analysis of bioactive compounds by GC-MS confirmed the presence of acetic acid, hexadecanoic acid, citric acid, 9-octadecenoic acid as the major membrane-active antibacterial compounds.

Keyword: Antibacterial mechanism; Minimum inhibitory concentration; Membrane damage; XTT assay