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Antibacterial activity of crude methanolic extract and fractions obtained from *Larrea tridentata* leaves

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Larrea tridentata (Zygophyllaceae), commonly known as creosote bush, is a plant that grows in semiarid areas of Southwestern United States and Northern Mexico and was traditionally used for medicinal purposes. This plant is a notable source of natural compounds with approximately 50% of the leaves (dry weight) being extractable matter. This study was designed to evaluate the antibacterial activity of the crude methanolic extract (CME) and fractions [hexane (H), dichloromethane (DCM), ethyl acetate (EA) and ethanol (Et)] obtained from *Larrea tridentata* leaves. A preliminary study of the antibacterial activity was performed using the agar diffusion method against six strains of Gram-positive and Gram-negative bacteria. The micro-dilution method was applied for the determination of the minimal inhibitory concentration (MIC) of selected bacteria strains. HPLC analyses of tested samples were also carried out. The antibacterial activity of the tested samples was noticeable more effective inhibiting the growth of Gram-positive bacteria comparing with Gram-negative bacteria, by the CME, DCM and EA fractions. EA fraction showed the highest antibacterial activity against methicillin-resistant *Staphylococcus aureus* isolated from secretion; with a MIC value (31.3 µg/mL) lower than the reference antibiotic tetracycline (64 µg/mL). Low MIC values (62.5 µg/mL) were also obtained for crude methanolic extract and DCM fraction compared to tetracycline. The highest concentrations of quercetin, kaempferol and nordihydroguaiaretic acid were observed in CME (8.67, 21.52 and 35.75 mg/g, respectively); nevertheless, EA fraction also showed considerable levels of these compounds compared with the remaining fractions. Other compounds were observed in the HPLC chromatograms and further studies are needed in order to identify them. The antibacterial activity of the samples studied might be explained by the synergistic or additive effects of several components rather than arising from a single compound. In conclusion, EA fraction showed the most promising results against the bacterial strain methicillin-resistant *Staphylococcus aureus*, which represents an important step for the search and development of a new antibacterial agent. Nevertheless, further toxicological and pharmacological studies are needed in order to confirm the hypothesis of using phytochemicals from *Larrea tridentata* leaves.

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