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Assessment of Antiplasmodial and Some Other Biological Activities, Essential Oil Constituents, and Phytochemical Screening of Azadirachta indica Grown in Ethiopia

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Abstract : Background: Azadirachta indica is the most versatile medicinal plant known as “the village pharmacy”. The plant is known for its broad spectrum of biological activity in India and various countries throughout history by many different human cultures. The present study was undertaken to determine the antimalarial and antidiabetic properties of the leaf extracts of A. indica grown in Ethiopia when treated in vivo. This work has also been concerned with determining essential oil composition and the antimicrobial activity of the plant in vitro. Methods: Leaf extracts were prepared using three different selected solvents. Standard and clinical isolates were treated with extracts of the leaves of A. indica using the agar well diffusion method. The antimalarial and antidiabetic tests were conducted in vivo in mice. Phytochemical screening was done using various chemical tests, and the volatile oil constituents were determined using gas chromatography-mass spectrometry (GC/MS). Results: In vivo antimalarial activity studies showed 85.23%, 69.01%, and 81.54% suppression of parasitemia for 70% ethanol, acetone, and water extracts, respectively. The extracts collected from the leaves also showed reduced blood sugar levels in alloxan-induced diabetic mice. In addition, the solvent extracts were shown to have an inhibitory effect on the growth of microorganisms under the study. The minimum inhibitory concentration (MIC) ranged from 850 to 1050 µg/ml. Notably, the phytochemical investigation of the ethanol extracts showed the presence of secondary metabolites. Seventeen compounds (mainly sesquiterpenes) that represent 75.45% of the essential oil were characterized by GC/MS analysis. Conclusion: Extracts examined in this study indicated that the leaf of A. indica grown in Ethiopia retained the biological activities demonstrating the extent equivalent to when it was grown in its natural habitat. In addition, phytochemical investigation and GC/MS analysis of volatile oil constituents showed comparable results to those presented in India and elsewhere.

Keywords : Azadirachta indica, vivo, antimalarial activity, antidiabetic activity, alloxan, mice, phytochemical
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