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Polarity directed extraction optimization, total phenolic-flavonoid content, HPLC-DAD analysis, antioxidant, antimicrobial, cytotoxic and anti-leishmanial potentials of *Atriplex lasiantha* Boiss

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Plants represent an intricate and innovative source for the discovery of novel therapeutic mediators for the management of various ailments. This study was aimed to validate the therapeutic potential of ethno medicinally significant plants *Atriplex lasiantha* Boiss. The polarity based extraction process was carried out using fourteen solvents to optimize best extraction solvent and bioactive fractions. Total phenolic-flavonoids contents were quantified colorimetrically and polyphenolics were measured using HPLC-DAD analysis. Further, the test samples were tested against several diseases targets including free radicals scavenging, antibacterial, antifungal, cytotoxic and anti-leishmanial potentials following standard procedures. Among the solvent fractions, maximum yield was obtained with methanol-water extract i.e., 11±0.49%. Maximum quantity of gallic acid equivalent phenolic content and quercetin equivalent flavonoid content were quantified in methanol-ethyl acetate extract of *A. lasiantha* aerial part. Significant quantity of rutin i.e., 0.3 µg/mg was quantified by HPLC analysis. The methanol-ethyl acetate extract of aerial part of *A. lasiantha* exhibited maximum total antioxidant and total reducing power with 64.8±1.16 AAE/mg extract, respectively, while showing 59.8±1.07% free radical scavenging potential. A significant antibacterial potential was exhibited by acetone-distilled water extract of aerial part of *A. lasiantha* with 11±0.65 mm zone of inhibition against B. subtilis. A remarkable antifungal activity manifested by ethyl acetate-n-hexane extract of aerial part of *A. lasiantha* with 14±1.94 mm zone of inhibition against *A. fumigatus*. Highest percentage of α-amylase inhibition potential (41.8±1.09%) was observed in ethyl acetate-n-hexane extract of *A. lasiantha* aerial part. Methanol-acetone extract of *A. lasiantha* demonstrated remarkable inhibition of hyphae formation with 11±0.49 mm bald zone of inhibition. Significant *in vitro* cytotoxicity against Hep G2 cell line was displayed by methanol-chloroforms extract of aerial part of *A. lasiantha*. The current study reveals the prospective potential of a novel plant *Atriplex lasiantha* Boiss. for the discovery of biologically active compounds through bioassay guided isolation in various diseases.

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