Phytochemical Screening and Anti-Inflammatory Activity of Plants Used In Sudanese Folkloric Medicine

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Background

Inflammation is a complex pathophysiological process mediated by a variety of signaling molecules and can be classified as either acute or chronic. Chronic inflammatory diseases remain one of the world’s major health problems.

This study aimed to evaluate the anti-inflammatory activity of some plants used in Sudanese folkloric medicine using bioactivity guided fractionation and phytochemical screening of the most active plants. It also aimed to identify, characterize and structurally elucidate the isolated constituents. Furthermore, the biological effectiveness of these isolates will be determined using a high performance thin layer chromatography (HPTLC) and high resolution gas chromatography-mass spectroscopy (GC-MS) fingerprint profile of the anti-inflammatory active extract fractions of Tribulus terrestris.
Method

Seventeen medicinal plants belonging to different genera and commonly used in Sudanese folkloric medicine as anti-inflammatory remedies, were investigated for their anti-inflammatory activity using carrageenan-induced inflammation in rats’ paws model. Standard Indomethacine was used as a positive control and the difference in results was considered significant when P < 0.05.

Results

Most plant extracts (63.9%) showed substantial impact with inflammatory mediators. 78.3% out of this percent represented the methanolic extract, 27.8% showed no activity and 8.3% enhanced the carrageenan induced inflammation. The most active plant extracts (Capparis deciduas, Cyperus rotundus and Tribulus terrestris) were further subjected for fractionation using chloroform, ethyl acetate, n-butanol and water sequentially, and then tested for their anti-inflammatory activity.

Bioactivity guided fractionation of Capparis deciduas led to isolation and characterization of three compounds with potent anti-inflammatory activity. Bioactivity guided fractionation of Cyperus rotundus led to isolation and characterization of two compounds with known anti-inflammatory activity. These compounds were isolated using different chromatographic techniques and their structures were identified by 1D NMR spectrum (C¹ and ¹H-NMR), 2D NMR (COSY, HSQC, HMBC Correlation), X-ray crystallography and GC-MS analysis. HPTLC and GC-MS studies of Tribulus terrestris revealed the presence of different spots/peaks in different Rf values, corresponding to different compounds. The suggested structures for those compounds were accomplished using a computer search by matching spectra with reference ones in the computer library (NIST and WILLY libraries). This fingerprinting was performed for the first time for this plant.

Conclusion

This study validated the traditional uses of the evaluated plants species in treating inflammatory disorders and adds to the knowledge data base of these folkloric medicinal plants. The compounds which were isolated may provide a new lead for more potent analogues and this research represents advanced methodological qualitative analysis of complex matrix such as herbal medicine where only limited information can be acquire using traditional techniques.