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Polyphenolic composition and antimicrobial and antioxidant activities of *Crataegus azarolus* L extracts

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Polyphenolic contents and antioxidant and antimicrobial activities of *Crataegus* extracts from different vegetative and reproductive organs of *Crataegus azarolus* var. *aronia* harvested at different stages of growth have been determined. Three solvent systems with varying polarities (ethyl acetate, butanol and methanol) were used. The DPPH and ABTS+ assays were used to characterize the antioxidant actions of the extracts. Antimicrobial activity was determined by using disk diffusion and dilution assays for the determination of the minimal inhibitory concentration (MIC) and the minimal bactericidal concentration (MBC) values of each active extract. The highest amounts of polyphenols (8454.2 ± 10.6 mg EAG/100g DW), flavonoids (2915.7 ± 20.9 mg RE/100g DW), and proanthocyanidins (3923.6 ± 227 mg cyanidin chloride/100g DW) were shown by the polar sub-fraction methanolic extracts. All extracts show a good antioxidant and antimicrobial activities, the most efficient being fresh young leaves, fresh floral buds and fresh green fruits. The activities seem to be especially bound to the total phenolic, proanthocyanidin and flavonoid contents.

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Synergistic anti-giardial activities of combinations of *Terminalia ferdinandiana* fruit compounds: Development of potent novel treatments for giardiasis

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In a recent study, we reported potent inhibition of *Giardia duodenalis* proliferation by extracts prepared from *Terminalia ferdinandiana* (Kakadu plum) fruit. That study also utilized a non-targeted metabolomics comparison approach to narrow the focus of compounds, highlighting 17 compounds as likely to contribute to that anti-proliferative activity. Notably, the majority of these compounds have previously been reported to have bioactivities consistent with anti-protozoal activities. The current study extends these earlier findings by testing pure compounds, both individually and in combination, for the ability to block *Giardia* proliferation. Interestingly, all of the pure compounds were either ineffective or of only low efficacy when tested alone in the anti-proliferative assay. In contrast, several combinations of these compounds displayed potent inhibition of giardial growth. Further examination of the anti-proliferative activity using the sum of fractional inhibitory concentration analysis (Σ FIC) indicated both synergistic and additive interactions for different compound combinations. Furthermore, the addition of ascorbic acid greatly enhanced the anti-proliferative efficacy of some of these combinations. All individual compounds and combinations were non-toxic/low toxicity in the *Artemia* nauplii toxicity assay. The low toxicity of the *Terminalia ferdinandiana* component combinations and their low toxicity indicate their potential as medicinal agents in the treatment and prevention of giardiasis.

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