

Comparison between *Harpagophytum* capsules: assessment of variability of harpagoside content and of antioxidant properties

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Devil's claw (*Harpagophytum procumbens* D.C.) is a perennial herbaceous plant that grows exclusively in the Kalahari Desert, an arid region of southern Africa. Its secondary tuberous roots are dried and commonly used in South African traditional medicine. In Europe capsules containing the dried extract are widely employed in the treatment of rheumatic disorders, low back pain, loss of appetite and dyspeptic complaints. The anti-inflammatory and analgesic effects of *Harpagophytum procumbens* and harpagoside, its main iridoid glycoside, have largely been studied (1). Grant et al. (2) hypothesized that these putative properties of *Harpagophytum* might be a consequence, at least in part, of its antioxidant effects.

The purpose of the present study was to verify quality and quantity of the micronized root powder contained in commercial capsules, to measure their content of harpagoside and to evaluate their potential antioxidant properties.

Three samples of capsules containing *Harpagophytum procumbens* of different commercial origin were examined. The root powder contained in the capsules was weighed and used to prepare ethanolic extracts.

The harpagoside content was determined by the Ouitas method (3); the antioxidant activity was evaluated by the FRAP and DPPH methods (4); the polyphenol content was measured according to a protocol used in our lab (4); finally, the ascorbic acid content was determined by the Ross method (5).

The results obtained showed a certain variability in both quality and quantity of the phytopreparations examined. In two formulations the root powder content was lower than declared (-16.8% and -22.9%). All the phytopreparations showed antioxidant properties; in particular, the highest antioxidant activity was observed in the formulation containing the greatest amount of harpagoside (three times higher than that of the others, $P < 0.001$) and the highest levels of polyphenols (+10%; $P < 0.001$) and ascorbic acid (+187%; $P < 0.001$). A significant correlation was found between antioxidant activity and harpagoside content ($r = 0.99$) and between antioxidant activity and polyphenol content ($r = 0.99$).

However, the commercial preparation with the highest content in harpagoside did not comply with the European Pharmacopoeia (the drug should contain at least 1.2% of harpagoside as determined by HPLC).

Having access to a variety of products sharing a similar appearance, the patient may experience widely variable therapeutic responses, since the minimum harpagoside content requested by the current pharmacopoeia monographs is not always observed by the manufacturers.

Stringent controls should be performed in order to ensure quality among the products based on *Harpagophytum procumbens*. Growing evidence of effectiveness is counterbalanced by inadequate regulation.

References

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