

Abstract

Mentha longifolia subsp. *polyadena* was collected from seven localities in South Africa and from a single population in Botswana to study the essential oil composition and antimicrobial activity of this ethnomedicinal plant. The essential oils were obtained by hydrodistillation and analysed by gas chromatography coupled to mass spectroscopy (GC/MS) and a cluster analysis was performed on the essential oil dataset. From eight samples (representing eight natural populations), two major chemotypes were identified: (i) a menthofuran rich type (51.4% - 61.6%); and (ii) a *cis*-piperitone epoxide (14.7% – 35.7%) and piperitenone oxide (14.6% - 65.7%) rich type.

The constituent analysis showed quantitative variation with higher amounts of oxygen-containing monoterpenes ranging from 56.5% to 89.6% whilst the sesquiterpene hydrocarbons ranged from 4.4% to 16.7%. The essential oil from the different localities mostly showed moderate to good antimicrobial activity against *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Bacillus cereus*, *Moraxella catarrhalis*, *Yersinia enterocolitica* and *Enterococcus faecalis*. The oils were generally inactive against *Escherichia coli* and *Salmonella typhimurium*. *Candida albicans* and *Cryptococcus neoformans* indicated highest sensitivities for oil samples from Komukwane (3 mg/ml and 0.5 mg/ml respectively) and Prins Albert (0.5 mg/ml and 1.6 mg/ml respectively).

The HPLC profiles of the methanol and chloroform (1:1) extracts were more conservative and less variable compared to the essential oils. Two major peaks corresponding to retention times of 22.39 min and 26.47 min were present in all eight samples. Most of the solvent extracts displayed moderate to good antimicrobial activity against Gram-positive

pathogens, in particular against *S. aureus*, *S. epidermidis* and *B. cereus* with MIC values ranging from 0.5 mg/ml to 2 mg/ml in most cases. The extracts also demonstrated moderate to good activity against most of the Gram-negative pathogens, in particular against *Y. enterocolitica* and *M. catarrhalis*, with MIC values ranging from 0.5 mg/ml to 2 mg/ml. These results may in part provide scientific evidence for the extensive use of *Mentha longifolia* in traditional healing.