Optimisation of ultrasound assisted extraction of antiacetylcholinesterase and antioxidant compounds from manuka (Leptospermum scoparium) for use as a phytomedicine against alzheimer's disease

ABSTRACT

Background: Alzheimer's disease is a progressive mental deterioration related to ageing and senility. Approved drugs that inhibit acetylcholinesterase (AChE) enzyme activity in the human brain are one of the ways to control the natural progression of this disease. The present study reports on the optimisation of ultrasound-assisted extraction of antiacetylcholinesterase and antioxidant compounds from manuka leaves using response surface methodology. Methods: A Box-Behnken design was used to investigate the effect of extraction temperature (40–60°C), time (1–20 min), and ethanol concentration (30–70%) on AChE inhibition, antioxidant activity, and extraction yield. Results: The values of AChE, radical scavenging activity (RSA) and yield predicted by the models generated were similar to the experimental values. Extraction time, ethanol concentration and temperature were significant in all the responses. Optimum extraction conditions for maximum AChE inhibition (74%), RSA (79%) and yield (50%) were successfully validated experimentally and the IC50 of the optimised extracts were reduced to 28.5 (from 66.0) and 2.37 (from 32.4) µg/ mL for AChE and antioxidant activity, respectively. The optimisation enabled an increase in the extraction yield from 21% to 49%. Conclusions: In view of the significant bioactive properties determined, with possible beneficial effects on memory deficit, we would encourage the use of the manuka leaf extract for the development of new phytopharmaceuticals to improve brain function and control dementias such as Alzheimer's disease. One other application could be as a beverage for the preparation of tea infusions.