

Anti- and pro-lipase activity of selected medicinal, herbal and aquatic plants, and structure elucidation of an anti-lipase compound

ABSTRACT

Plants that help in slowing down the digestion of triacylglycerols (TAGs) in the pancreas and small intestine of humans play an important role in the reduction of obesity. On the other hand, there may be plants or plant parts that stimulate intestinal lipolytic activity, thus contributing to greater TAG assimilation. The aim of this study was to evaluate the aqueous methanolic extracts of ninety eight (98) medicinal, herbal and aquatic plant materials from Malaysia for their effect on porcine pancreatic lipase (PPL) activity and to identify the structure of an anti-lipase compound from one of the sources. The degree of inhibition was also quantified as relative to orlistat activity against PPL (orlistat equivalents). Results revealed that while 19.4% of the extracts were found to have anti-lipase activity $\geq 80\%$, 12% were actually found to promote PPL activity. Twenty two percent (22.4%) exhibited moderate inhibition (41%–80%) and 2% were neutral toward PPL activity. The ripe fruit of *Averrhoa carambola* and the leaves of *Archidendron jiringa* (Jack) I.C Nielsen L. (jering), *Cynometra cauliflora* (nam-nam) and *Aleurites moluccana* (L.) Willd (candle nut/buah keras) had the highest (100%) anti-lipase activity and are equivalent to 0.11 μg orlistat/mL. Plants that stimulated lipase activity included *Pimpinella anisum* L. (aniseed/jintan manis), activating the enzyme by 186.5%. Kaempferol 3-O-rhamnoside was isolated from the ethyl acetate fraction of *C. cauliflora* leaves and found to be an active lipase inhibitor. The structure was elucidated using $^1\text{H-NMR}$, $^{13}\text{C-NMR}$ and 2D-NMR analyses.

Keyword: Anti-lipase activity; Pro-lipase activity; Plant extracts; Orlistat equivalent; Kaempferol 3-O-rhamnoside