

Evaluation of phytochemicals and antioxidant potential of a new polyherbal formulation TC-16: additive, synergistic or antagonistic?

ABSTRACT

Background Scientific literature has demonstrated the association of free radicals in the etiology of various chronic diseases. Hence, the identification of potent antioxidants remains a useful task. The combination of multiple herbs in polyherbal formulations (PHF) is often associated with greater therapeutic efficacy due to synergistic interactions. However, antagonism can occur in natural product mixtures and the resultant antioxidant potential might not always be the additive value of the antioxidant properties of each component. In this study, we aimed to evaluate the phytochemicals, antioxidative potential and interaction among the herbs in TC-16, a new PHF comprising *Curcuma longa* L., *Zingiber officinal* var. *Bentong*, *Piper nigrum* L., *Citrofortunella microcarpa* (Bunge) Wijnands and *Apis dorsata* honey. Methods TC-16 was screened for phytochemicals. Phenolic and flavonoid contents of TC-16 and its individual ingredients were determined, followed by assessment of antioxidant properties using in vitro assays including 2,2'-azinobis(3-ethylbenzothiazoline-6-sulfonate) (ABTS), 2,2-diphenyl-1-picrylhydrazyl (DPPH), ferric reducing antioxidant power (FRAP), oxygen radical absorbance capacity (ORAC) and β -carotene bleaching (BCB) assays. Interactions among the herbs were also investigated by calculating the difference in antioxidant activity and combination index. Results Alkaloids, flavonoids, terpenoids, saponins and glycosides were present in TC-16. TC-16 possessed the highest phenolic (46.14 ± 1.40 mg GAE/g) and flavonoid (132.69 ± 1.43 mg CE/g) contents following *C. longa*. Synergistic antioxidant activity among the herbs was evident in ORAC and BCB assays which uses mainly hydrogen atom transfer-based antioxidant mechanisms. Conclusions TC-16 demonstrated roles in combating free radicals. In a PHF, synergistic interaction among the herbs is observed in some but not all mechanisms. Mechanisms showing synergistic interactions should be highlighted to maximize the beneficial property of the PHF