

Comparative studies of bio activity and chemistry of combined plant extracts

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Diabetes and hyperlipidemia are non-communicable diseases which have been major health problems in Sri Lanka and recent reports have shown that there is an increased prevalence among young adults. At present there is a big demand for natural remedies used in Ayurvedic medicine for these conditions due to the adverse perceptions regarding prolonged usage of synthetic drugs. The key traditional therapeutic herbal strategy applied in ayurveda is the combining of several medicinal herbs to achieve extra therapeutic effectiveness, usually known as polypharmacy or polyherbalism. This study mainly focused on the importance of the polyherbalism and its clinical and chemical significance, utilizing a plant mixture made of leaves of *Murraya koenigii* and fruits of *Garcinia quaesita* Pirre, used for diabetes treatments.

A comparative study of bio activity and chemistry of plant extract mixtures of leaves of *M. koenigii* and fruits of *G. quaesita* with respect to their individual plants is reported. Bioactive compounds of both plants are proven to have many functional properties. However, chemistry and bioactivity of combined plant extracts have not been reported thus far. In this study, for each plant and the mixture, antioxidant activity (using DPPH radical scavenging assay), cytotoxicity using the brine shrimp (*Artemia salina*) lethality assay and the total polyphenol content (TPP) by Folin-Ciocalteu method (expressed as the gallic acid equivalent (GAE) in milligrams per gram of dry material) of hexane, ethyl acetate (EtOAc), methanol (MeOH) extracts were investigated. Furthermore, chemistry of the methanol and the ethyl acetate extracts were compared using gas chromatography and all methanol extracts were further analyzed using high performance liquid chromatography (HPLC). All the plant extracts showed antioxidant activity between IC₅₀ 8.02-340.8 ppm compared to that of α -tocopherol (IC₅₀ 13.46 ppm). The ethyl acetate extract of *M. koenigii*(ME) and the hexane extract of *G. quaesita* (GH) have relatively high antioxidant activity with IC₅₀ of 8.02 and 8.74 ppm respectively, while the combined plant extracts of hexane(CH) and EtOAc (CE) showed antioxidant activity of 9.74 ppm and 28.72 ppm respectively. All the plant extracts except for the MeOH extract of *G. quaesita* (GM)(LC₅₀ =100.89) and hexane extract of *M. koenigii* (MH) (LC₅₀ =318.27) showed the higher cytotoxicity and the GH showed the highest LC₅₀ values of 0.45 ppm among all the extracts compared to that of positive control (K₂Cr₂O₇ LC₅₀ 35.78 ppm). The combined plant extracts of hexane (CH), EtOAc(CE) and MeOH(CM) have the cytotoxicity values in between *M. koenigii* and *G. quaesita*. The highest TPP content 32.04 mg (GAE)/g was obtained for the CM. Gas chromatography and HPLC studies of the plant mixture showed new peaks, which do not appear in their individual methanol extracts. Further, HPLC studies of the mixture showed absent of peaks, which were appeared in their individual methanol extracts. This preliminary study showed that, chemistry of combined plant extracts is differing from the individual plant extracts and it may have resulted the observed synergistic effects on their bioactivities. Future studies will be focused on further identification of the new peaks appeared in GC and HPLC chromatographic studies and isolation of those responsible compounds.