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Biological Evaluation and LC-MS Analysis of Propolis from Brazil, Peru, China and the Netherlands

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Propolis is a resinous hive product collected by honeybees from various plant sources. The composition of the propolis depends upon the time, vegetation and the area of collection. Thus, quality evaluation of the propolis is important, before to be used in food and beverage. For this propose we carried out three different biological activities, *i.e.*, 1,1-diphenyl-2-picrylhydrazyl (DPPH) free radical scavenging activity, cytotoxicity and hepatoprotective activity, of MeOH and water extracts of nine different propolis from Brazil, Peru, the Netherlands and China. The results showed that water extracts of six Brazilian and a Chinese propolis possessed stronger DPPH free radical scavenging activity than the corresponding MeOH extract, whereas in the case of Netherlands and Peruvian propolis MeOH extract exhibited stronger DPPH free radical scavenging activity. The MeOH extracts of all propolis possessed stronger cytotoxicity than the corresponding water extract towards murine colon 26-L5 carcinoma and human HT-1080 fibrosarcoma cells. The result of hepatoprotective activity of Brazilian propolis on D-GalN/TNF-α-induced cell death in primary cultured mouse hepatocytes were found in accordance with the grade setted up by beekeepers in Brazil. Based on the standard samples, either isolated from Brazilian propolis or reported from propolis including chromane, diterpenes and phenolic compounds, water and MeOH extracts of six different Brazilian propolis were analyzed by liquid chromatography-mass spectrometry (LC-MS). Almost all water extracts of Brazilian propolis contained dicaffeoylquinic acids and their MeOH extracts had diterpenes, flavonoids and prenylated phenolic compounds. By comparing the detected compounds and their hepatoprotective activity, it was concluded that the quality of Brazilian propolis could be correlated with the quantity of phenolic compounds such as caffeic acid derivatives and flavonoids. Moreover, based on the identified components, *Baccharis dracunculifolia* was believed to be an important source of Brazilian propolis.