

ABSTRACT

Coffee derives from the green beans of the *Coffea sp* plant and is considered to be one of the most popular beverages worldwide due to its stimulating effect and organoleptic properties. Since coffee is a plant-based extract it comprises a plethora of potentially bioactive compounds, including the alkaloid caffeine (coffee's most known substance) and polyphenols (mainly chlorogenic acids). The popularity of this beverage has attracted scientific attention, since numerous studies have examined its potential effects on human health. A vast number of data has been amassed, however the exact molecular mechanism of action remains elusive.

The current work aimed at investigating coffee's bioactivity. To that end, 12 coffee varieties were screened in terms of their antioxidant activity using a range of *in vitro* assays, including radical scavenging capacity, cell redox status assessment and mutagenicity assays. The effects of coffee origin, roasting time and decaffeination were also analyzed. According to the results, all extracts exhibited potent antioxidant activity correlating to their polyphenolic content, however differences were observed between the varieties. Coffee's complex mode of action is noteworthy, since intermediate concentrations exhibited the highest activity.

The most potent coffee extract, according to the screening analysis, was administered in rats (at a dose that equals moderate daily consumption in humans) to examine its effect on blood and tissue redox status as well as whether the *in vitro* results had translational potency *in vivo*. According to the results, coffee greatly affected rat tissues by enhancing antioxidant activity markers (such as the reduced glutathione levels) and lowering macromolecular oxidations, interestingly through a stimulation of endogenous antioxidant mechanisms. Therefore, moderate coffee consumption seems to exert beneficial health effects, rendering it an important source of dietary antioxidants."