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The effect of green-coffee-bean extract rich in chlorogenic acid on antioxidant status of healthy human volunteers

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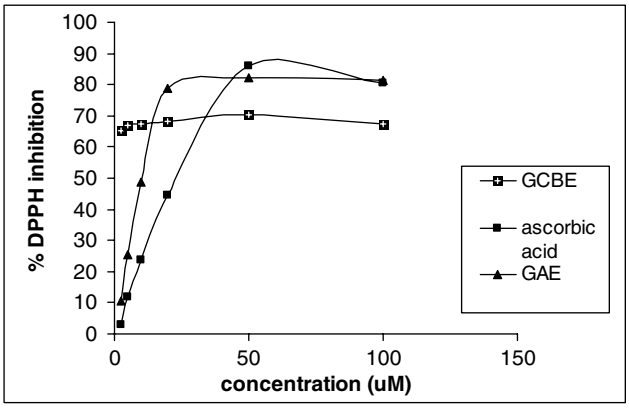
Several studies have linked consumption of green-coffee-bean extract (GCBE) rich in chlorogenic acid (CGA) with reduced blood pressure[1–3]. It is hypothesised that increased antioxidant activity could be one of the underlying mechanisms by which GCBE reduces blood pressure. To test this hypothesis a GCBE preparation rich in CGA was assessed by three extraction methods for antioxidant activity. *In vivo* antioxidant activity was also determined in a group of healthy volunteers.

The phenolic content of GCBE, as determined by the Folin-Ciocalteu method, varied greatly between the ethanolic acidified water (0.2% (v/v) formic acid) and acetonitrile extract (acetonitrile–water containing 0.2% (v/v) formic acid; 50:50, v/v): 123 (SD 0.23), 131 (SD 0.66) and 211 (SD 0.51) mg gallic acid equivalents (GAE)/g extract respectively. Similar findings were observed with the Fe^{3+}-reducing ability of plasma (FRAP) assay, wherein the acetonitrile extract exhibited a stronger Fe^{3+}-reducing ability than the ethanolic extract (0.067 mmol/g extract *v.* 0.048 mmol/g extract). The 2,2-di(4-*tert*-octylphenyl)-1-picrylhydrazyl (DPPH) radical-scavenging activity of the ethanolic extract of GCBE was 70.4% at 50 μM as compared with ascorbic acid (86.1% inhibition at 50 μM) and GAE (82.2% at 50 μM).



To examine *in vivo* antioxidant properties of GCBE thirteen healthy volunteers (age 36 (SD 11) years, BMI 28 (SD 2.5) kg/m^2) consumed 200 mg GCBE containing 90 mg CGA twice daily for 2 weeks. *In vivo* antioxidant activity was determined using the Folin-Ciocalteu method and FRAP. There was a significant correlation between urinary polyphenols excretion as determined by the Folin-Ciocalteu method and FRAP (0.664, $P<0.0001$). However no significant increase in urinary antioxidant activity was observed (total phenolics: 173.2 (SD 137.8) mg GAE/g creatinine *v.* 175.20 (SD 115.7) mg GAE/g creatinine, $P>0.05$; FRAP: 2.07 (SD 0.9) mmol Fe^{2+}/g creatinine *v.* 1.56 (SD 0.7) mmol Fe^{2+}/g creatinine, $P>0.05$). Systolic blood pressure decreased from 119 (SD 10.5) to 114 (SD 9.1) mmHg ($P=0.05$) following the 2-week treatment.

In conclusion, green coffee bean extract has a high antioxidant activity. However, no changes in antioxidant activity are observed in urine. This finding is consistent with previous findings of poor antioxidant activity of hippuric acid, the main urinary metabolite of chlorogenic acid[4]. Further research is required to identify the mechanism(s) of reduction in blood pressure. The antioxidant activity of plasma should also be determined.

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