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Absorption and serum protein binding of tea polyphenols in rats, after administration of caffeine with tea extract

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Tea (*Camellia sinensis*) is considered as one of the most widely consumed beverages in the world. Polyphenolic compounds and methylxanthines (caffeine, theophylline and theobromine) present in tea contribute to the beneficial pharmacological effects ascribed to tea. It has been shown that, absorption of caffeine is high when caffeine is administered with the tea extract. This study was carried out to determine the absorption and serum protein binding of tea polyphenols after administration of caffeine with a tea extract.

Caffeine was administered with tea extract (0.02 g cm^{-3}, 2.5 cm^3) to male Sprague Dawley rats (n=6) at a dose of 100 mg/kg body weight. Blood was collected at one and three hours after administration. Proteins were separated using centrifugal filter tubes with a cut off value of 3 KD molecular weight. Serum and the filtrate were analyzed for tea polyphenols using gallic acid as the standard. Total and protein unbound polyphenol content were determined using the Follin- Ciocalteu assay.

The total phenol concentrations (mean ± SD) were 26.92 ± 0.74, 32.53 ±1.94 and 28.86 ± 1.81 µg cm^{-3} gallic acid equivalents, at 0 hour, 1 hour and 3 hours respectively. A small but significant increase ($p<0.05$) in the serum phenolic levels at 1 hr was observed when compared to the serum levels before administration of tea extract. The concentration of tea polyphenols in the protein free filtrate were (mean ± SD) 18.15 ±1.56 and 12.06 ± 0.78 of µg cm^{-3} gallic acid equivalents and the percentage of protein unbound fraction of tea polyphenol to the total polyphenol in serum (mean ± SD) were 58.51 ± 3.42 and 45.36 ± 2.19 at 1 hr and 3 hrs respectively. The results suggest that polyphenols bind to serum proteins and may alter the disposition of caffeine in rats.