

Physiological and Pharmacological Activities of Nutraceutical Tea by Leaves and Flowers of Domestic Camellia(*Camellia japonica*)

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This project was conducted to development several camellia tea mixed herb teas having any physiological effects. Leaves of tea tree contain many compounds, such as polysaccharides, volatile oils, vitamins, minerals, purines, alkaloids(eg. caffeine) and polyphenols(catechins and flavonoids). Although all three tea types(green, oolonn and black) have antibacterial and free radical capturing(antioxidizing) activities, the efficacy decreases substantially the darker the variety of tea is. This is due to lower contents of anti-oxidizing polyphenols remaining in the leaves. Unlike tea tree(*Camellia sinensis*), the biochemical features and effects of camellia(*Camellia japonica*) are not well known.

Fresh mature leaf of sasanqua camellia(*C. sasanqua*), roasted young leaf tea(*C. japonica*) and fresh mature leaf and bark of camellia had high antibacterial activity against *P. vulgaris* and *B. subtilis*. In antifungal activity bioassay, young leaf roasted teas of camellia and sasanqua camellia had high activity against *C. albicans* and *T. beigeli*. Plant extracts from *Camellia japonica* had higher inhibitory activity against fungi than against bacteria.

In cytotoxic effect against human acute myelogenous leukaemia cell extracts including fresh leaf(200 μ g/ml), bark(230 μ g/ml) and flower tea (320 μ g/ml)inhibited growth of AML cells.

Methanol extract of stamed camellia leaf tea and roasted camellia tea had a chemosensitizing effect to reverse Pgp-mediated MDR. In addition, camellia flower tea of insignificant cytotoxicity, chemosensitizing effect were increased remarkable chemosensitizing effect in mixed flower tea with some herbs.

In the antithrombotic test, fermented young leaf tea, roasted young leaf tea and flower tea had the strong activity in proteolytic activity. However, no significant fibrinolytic activity was observed.

At the final concentration of 200 μ g/ml, methanol extracts from camellia flower tea, and

water extracts from roasted and steamed leaf teas had antioxidant activity by 20% each against AML cell lines.

Experiments were conducted to determine whether these camellia tea have anti-hepatotoxic effects in mice. Anti-hepatotoxic effect of camellia methanol extracts on CCl₄ induced liver dysfunction in male and female mice. Control and sample mice were treated intraperitoneally with CCl₄(1ml/kg body weight) with corn oil(vehicle), and serum level of AST was measured after 7 days. Saline as vehicle to control, methanol extracts of camellia to sample were administered to mice for 5 days after CCl₄ injection. But camellia extracts showed anti-hepatotoxic effect.

To see the anti-proliferative effect on cancer cell, each extracts of camellia was treated to HL-60, human leukemia cell line, and the [³H]-thymidine uptake was measured. The relationship of apoptosis, the presence of apoptotic cells was searched through the cell morphology observation and DNA-fragmentation test. To determine the apoptotic pathway, caspase activity and PARP cleavage were searched. After HL-60 cells were treated with methyl alcohol extract of fresh leaves for 48 hours, the microscopic observations demonstrated the apoptotic characters. And 250 µg/ml concentration of methanol extracted leaves treated HL-60 showed decreased proliferation activity. In these concentration, they also induced apoptosis in HL-60 cells. Treatment of these extracts induced the the activation of Caspase-3 and finally the cleavage of PARP. These results suggest that the anti-proliferative activity of fresh camellia leaf was the results of the induction of apoptosis through the cleavage of PARP.

Methanol extracts of fermented leaf tea and flower tea were prepared and a dose of 100 and 400mg/kg was administered orally into mice. And after two weeks, changes of serum enzyme activities of creatinine, BUN and aspartate aminotransferase(ALT) were investigated to confirm the short term administration safety. Result showed no toxicity on kidney and liver within the dose of 400mg/kg.

Methanol extracts of fermented leaf tea and flower tea were prepared and administered ad libitum into mice. And after three months, changes of serum enzyme activities of creatinine, BUN and ALT were investigated to confirm the long term administration safety. Result showed no toxicity on kidney and liver in male and female mice.