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Effect of infusion conditions on phytochemical, total phenolic, and total flavonoid contents of novel herbal green and black tea products

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Background: Tea is the most widely consumed beverage worldwide.
Objective: To study the effect of infusion time and temperature on phytochemical profiles, total phenolic and total flavonoid contents of novel herbal green and black tea products.
Method: Novel herbal tea products were prepared incorporating powders of dried *Zingiber officinale* (ginger) rhizomes, *Allium sativum* (garlic) bulbs, *Vanilla planifolia* (vanilla) pods and *Camellia sinensis* (black and green tea) leaves in different proportions. Infusions were obtained at 80 °C, 90 °C or 100 °C for constant infusion time (7 minutes) and at constant infusion temperature (100 °C) for 3, 5 and 7 minutes. Each infusion was subjected to phytochemical screening and determination of Total Phenolic (TP) and Total Flavonoid (TF) contents. Data were analyzed with one sample t-test using SPSS 25.0.
Results: Phytochemical screening showed the presence of phenolics, flavonoids, tannins, terpenoids, diterpenes, triterpenes, phytosterols, alkaloids, saponins, carbohydrates, proteins and amino acids in all extracts. It was revealed that TP and TF contents of herbal black tea products were significantly high when brewed at 100 °C than at 80 °C and 90 °C while they were high for green tea products when infused at 80 °C than at 90 °C and 100 °C during a constant infusion time of 7 minutes. At constant temperature of 100 °C, TP and TF contents for black tea were significantly high when brewed for 3 minutes than infused for 5 and 7 minutes whereas it was high for green tea when infused for 7 minutes than infused for 3 and 5 minutes ($p<0.05$).
Conclusion: It was concluded that black tea products should be shortly boiled (3 minutes) at 100 °C whereas green tea products should be long brewed (7 minutes) at a low temperature (80 °C) to obtain tea extracts with promising levels of phenolics and flavonoids.