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EFFECTS OF TEA ORIGIN, TYPE, CONCENTRATION AND BREWING TIME ON ESSENTIAL AND TRACE ELEMENTS IN TEA INFUSION AND DAILY INTAKE BY HUMAN

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Abstract

The economic and social significance of tea is easily understood from the fact that approximately 20 billion cups of brewed tea are consumed daily worldwide. Türkiye and Sri Lanka are major tea producers, following China, India, and Kenya. The objective of this study was to determine the influence of origin (Turkish and Ceylon), type (black and green), and concentration (1%, 2%, and 3%), as well as brewing time (2, 5, 10, 20, 30, 45, and 60 minutes) on the trace elements (Al, Cd, Cr, Cu, Fe, Hg, Mn, Ni, Pb, and Zn) and daily intake in tea infusion. The concentrations of Al, Fe, Mn, and Ni in Turkish tea infusions were higher than those in Ceylon tea infusions, while the Cu content of Turkish tea infusions was lower than that of Ceylon tea infusions. Moreover, the infusion made from Turkish tea had similar Zn, Cd, Cr, Hg, and Pb value to its Ceylon counterpart. The average Al, Cu, Fe, Mn, Ni and Zn content of black and green tea infusions were 3.584 ± 0.217 , 4.188 ± 0.229 mg L⁻¹; 0.040 ± 0.000 , 0.051 ± 0.003 mg L⁻¹; 0.090 ± 0.008 , 0.119 ± 0.006 mg L⁻¹; 2.626 ± 0.277 , 3.206 ± 0.229 mg L⁻¹; 0.040 ± 0.000 , 0.040 ± 0.000 mg L⁻¹; 0.161 ± 0.007 , 0.176 ± 0.008 , respectively. Pb was only extracted in 3% concentration of Ceylon green tea infusion with 45 and 60 min (0.063 mg L⁻¹). Cu and Fe concentration of black tea infusions was lower than green counterpart. Tea concentration did not affect Cd, Cr, and Hg amount. In general, the longer brewing time and high tea concentration were found to have a higher toxic metal content in tea infusion. Except for Mn and Pb, human daily intake rates of trace elements did not exceed the limits.

Key words: Ceylon/Turkish tea, infusion time, tea concentration, tolerable daily intake, trace elements

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