Anti-Oxidant Activity and Tyrosinase Inhibitory Activity of Ceylon Black Tea Extracts: Water Extract of Ceylon Black Tea Regulate Anti-Melanogenic Activity by Suppressing Tyrosinase, TRP-1, TRP-2 and MITF in B16F10 Melanoma Cells

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With the growing popularity of skincare products around the world, cosmetic applications of plant extracts are gaining continuous attention in cosmeceutical industries. Therefore, this study aims to investigate the anti-melanogenic effect of Ceylon black tea extracts. In this study five different black tea extracts were prepared with distilled water (extraction by autoclave, extraction at 80°C for 2 h) and organic solvents (ethanol, methanol, acetone). Each extract of black tea was tested for total phenol content, total flavonoid content, DPPH radical scavenging activity and tyrosinase inhibitory activity. Finally, different concentrations of tea extract were tested in B16F10 melanoma cells for cytotoxicity and protein suppression levels. According to the results of this study, the highest yield of 42.93% was obtained from the ethanol extraction followed by 40.19% from acetone extraction. Highest total polyphenol contents were obtained from ethanol and acetone extractions with 240.30±1.40 µg/g and 240.20±4.70 µg/g concentrations. The highest total flavonoid content was obtained from acetone extraction with the concentration of 57.49±4.70 µg/g. Distilled water extract of Ceylon black tea exhibited the highest inhibitory activity on tyrosinase with an IC_{50} value of 0.016±0.001 mg/ml whereas ethanol extract exhibited the highest DPPH radical scavenging activity with an EC_{50} value of 0.009±0.000 mg/ml. Treated concentrations of 10 to 50 µg/ml were not cytotoxic to B16F10 cells and exhibited more than 80% cell viability at all treated concentration. Further, western blot results revealed the suppression of tyrosinase, TRP-1, TRP-2 and MITF protein expression levels in dose dependent manner. Therefore, we suggest the applicability of distilled water extract of black tea as a novel melanogenesis inhibitor and skin-whitening agent in Sri Lanka cosmeceutical industries.

***Keywords*:** Cosmeceuticals; Black tea; Anti-melanogenic; Green extraction; Tyrosinase