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Inhibitory effect of phlorotannins isolated from Ecklonia cava on mushroom tyrosinase activity and melanin formation in mouse B16F10 melanoma cells.

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Abstract

In this study, to assess the feasibility of phlorotannins isolated from Ecklonia cava as an inhibitor of melanin formation, we evaluated its inhibitory effects on mushroom tyrosinase and 3-isobutyl-1-methylxanthine (IBMX)-induced melanin formation inhibitory effects in B16F10 melanoma cell. The ethanolic (EtOH) extract and ethyl acetate (EtOAc) soluble fraction obtained from E. cava evidenced a marked inhibitory effect on mushroom tyrosinase at a concentration of 50 μg/mL. Repeated column chromatography of the active EtOAc fraction resulted in the isolation of three phlorotannins. Their structures were elucidated on the basis of spectroscopic techniques [1D and 2D nuclear magnetic resonance (NMR)] and characterized as phloroglucinol (1), dioxinodehydroeckol (2), and 7-phloroeckol (3), respectively. Among the compounds, 7-phloroeckol (3) evidenced more potent tyrosinase inhibitory effect with an IC(50) value of 0.85 μM than arbutin (IC(50) = 243.16 μM) and kojic acid (IC(50) = 40.28 μM), which were used as positive controls. Lineweaver-Burk plots suggest that 7-phloroeckol plays as a noncompetitive inhibitor against tyrosinase. Furthermore, these compounds were evaluated for their inhibitory effects on IBMX-induced melanin formation in B16F10 melanoma cells. Treatment with 7-phloroeckol (6.25-100 μM) resulted in a significant inhibition of melanin production in the melanoma cells. In this study, we suggest that 7-phloroeckol might prove useful as a novel inhibitor of melanin formation in cosmetic applications.