

Abstract

Project Code: RSA5580012

Project Title:ฤทธิ์ต้านอนุมูลอิสระของสาร phytochemical phenolics ต่อการยับยั้งรังสีอัลตราไวโอเล็ตในการกระตุ้นการเกิดเม็ดสีและ matrix metalloproteinase-1 ในเซลล์ผิวหนัง

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Ultraviolet (UV) has been recognized to be a major factor accountable for photodamage possibly through oxidative damage of skin cells including melanocytes and keratinocytes. Responses of skin cells to oxidative stress include stimulation of melanogenesis in melanocytes and of matrix metalloproteinase-1 (MMP-1) responsible for collagen destruction, a hallmark of photoaged skin. Glutathione (GSH), GSH-related enzymes including γ -glutamate cysteine ligase (γ -GCL), glutathione S-transferase (GST) and glutathione peroxidase (GPx) and catalase (CAT) are important antioxidant defenses accountable for maintaining cellular redox balance. Improving antioxidant defense capacity to cope with oxidative insults would thus represent a promising strategy for inhibition of photoaged skin. Natural products including phytochemical phenolics have gained remarkable attention as potential photoprotective agents due to their antioxidant properties. Antioxidant phenolics, in particular, caffeic acid (CA), ferulic acid (FA) and gallic acid (GA), have been identified as common active ingredients in several medicinal herbs including Ayurved Siriraj Brand Wattana formula (AVS073) and Ayurved Siriraj Harak formula (AVS022), which have traditionally been used for health promotion and prevention of age-related problems. In order to develop natural products possessing antioxidant properties as effective photoprotective agents against skin aging, we therefore explored antioxidant mechanisms by which herbal extracts and the phytochemicals inhibited UVA-mediated melanogenesis in B16 melanoma cells and MMP-1 upregulation in keratinocyte HaCaT cells. Our findings showed that all test phenolics inhibited UVA-induced melanogenesis and MMP-1 in association with promotion of antioxidant defenses including GSH antioxidant system at cellular and molecular levels. Our study suggests that upregulation of endogenous antioxidants could be the mechanisms by which the herbal formula studied and their possible active ingredients, CA, FA and GA, suppressed UVA-stimulated pigmentation and MMP-1. Upregulation of antioxidant defense system by natural products would thus represent a promising opportunity for development of putative photoprotective agents for inhibition of premature skin aging.

Keywords: Ultraviolet A; melanogenesis; matrix metalloproteinase-1 (MMP-1); antioxidant defenses; natural products