Effect of extraction procedure on the yield and biological activities of hydroxychavicol from *Piper betle* L. leaves

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1. Introduction

Herbal and natural raw materials have gained unprecedented attention in cosmetics, food additives, medicinal formulations, fragrances, and nutrition owing to the complex mixtures of several compounds in their matrices exhibiting synergetic and additive properties (Kharbach et al., 2020). *Piper betle* L. is one of the dicotyledonous plant species that grow heavily in Southeast Asia. In Malaysia, it is locally known as *sirih*. This species belongs to the Piperaceae family. It is a climber species and mainly cultivated for its leaves (Choudhary and Kale, 2002). This species is known in traditional folk medicine for oral care. In modern medicine, owing to its non-toxic properties both in vitro and in vivo, it is being intensively studied and found to have many strong biological activities such as antioxidant, anticancer, antibacterial, antifungal as well as anti-fertility, hepatoprotective, immunomodulatory, anti-allergic, gastro-protective, and wound healing (Dasgupta and De, 2004; Ma et al., 2013; Yadav et al., 2014; Venkadeswaran et al., 2016). To date, this plant has been known as a high-value herbal plant by the Malaysian government and worthy further studies. Many health care products have been formulated with *P. betle* L. extract as one of the main ingredients (Ali et al., 2018). *P. betle* L. is rich with phenolic compounds from the class of phenylpropanoid (Rimando et al., 1986). One of the major and active compounds found in this species is hydroxychavicol. This compound has been reported to possess strong...