INTRODUCTION

Clinacanthus nutans Lindau is a plant species belonging to the family Acanthaceae. It is a small shrub usually found in South East Asia, particularly in Malaysia and Thailand (Tuntiwachwuttikul et al., 2004). C. nutans is known as Sabah Snake Grass in Malaysia. The leaves are in paired opposite arrangement, narrowly elliptic-oblong in shape and pale green in color. It has small, soft, thin and slightly curved stem that resembles the curve of an elephant’s trunk. Thus, it is also known as Daun Belalai Gajah (elephant’s trunk) in Malay. C. nutans has often been mistaken for Clinacanthus siamensis Brem which has a similar appearance. The leaves of C. nutans can be consumed as raw vegetable or mixed with other juices, such as apple juice and sugarcane juice, or green tea, and served as fresh drink or refreshing beverage. Moreover, dried leaves of this plant can be soaked in hot water and served as tea. C. nutans has been used to treat diabetes mellitus, fever, diarrhea and dysuria (P’ng et al., 2012). It has also been demonstrated to have heat and stasis reducing effects, cleanse liver and gallbladder effects, and regulate menstruation. Recently, there are many C. nutans products available in market in the form of herbal tea, capsules, tablets and concentrated plant extracts. However, formulation of C. nutans as a commercially packaged fresh drink remains rare. Moreover, the popularity of these products in the northern region of Peninsular Malaysia remains low due to lack of information of these products and promotion initiative.

C. nutans is commonly used in traditional Malaysian medicine for its nourishing and anti-oxidant properties. Recently, the extracts from leaves of C. nutans have been used extensively as primary sources of complementary and alternative healthcare or as economical in-house regimens for cancer patients (P’ng et al., 2012). Patients have claimed that they have recovered from cancer illnesses after consuming C. nutans.
C. nutans leaves over a certain period of time. In Thailand, it has been categorized as principal medicinal plant for primary healthcare by the Thai Ministry of Public Health (National Drug and Committee, 2006), for the treatment of skin rashes, insect and snake bites, herpes simplex virus (HSV) and varicella-zoster virus (VZV) lesions (Wanikia et al., 2009; Vachirayontistien et al., 2010; Kongkaew et al., 2011). Despite the two recent publications from Universiti Putra Malaysia, the scientific information on C. nutans from the research in Malaysia remains limited (Liew et al., 2012; Yong et al., 2013). Most of the publications reported that the extracts from C. nutans, especially leaves, possess analgesic, anti-oxidant, anti-inflammatory and anti-viral activities against HSV-1, HSV-2, VZV and HPV (Janwitayanuchit et al., 2003; Pannangpetch et al., 2007; Sakdarat et al., 2009; Vachirayontstien et al., 2010; Kongkaew et al., 2011). For example, an ethanolic extract of dried leaves of C. nutans was reported by Pannangpetch et al. (2007), to possess anti-oxidant activity and protective effect against free radical-induced hemolysis.

The important compounds isolated from C. nutans are stigmasterol, lupeol (Dampawan et al., 1977), β-sitosterol (Dampawan et al., 1977), betulin (Lin et al., 1983), six known C-glycosyl flavones (vitexin, isovitexin, shaftoside, isomollupentin-7-O-β-glucopyranoside, orientin and isoorientin) (Teshima et al., 1997), sulfur-containing glucosides (Teshima et al., 1998), glycosylglycerolipids, a mixture of nine cerebrosides and monoacylmonogalactosylglycerol (Tuntichwuttikul et al., 2004). Some of these compounds are demonstrated to have some degrees on bioactivity. For example, glycosylglycerolipids were reported to exhibit anti-viral activity (Sakdarat et al., 2009). Additionally, trigalactosyl and digalactosyl diglycerides that were isolated from C. nutans leaf extracts were shown to have anti-herpes simplex virus effect (Janwitayanuchit et al., 2003). The success of clinical trials using C. nutans cream to relieve skin inflammation and lesions caused by genital herpes and varicella-zoster virus infections were also reported by Charuwichitratana et al. (2007). Therefore, more products should be developed from C. nutans, but not limited only to food and beverage.

Although several papers have published the properties of C. nutans extracts, such as it contains six known C-glycosyl flavones, studies on the amount of flavones per se are yet to be conducted. It is important to determine the levels of flavones in C. nutans extracts as flavones, including apigenin, chrysin and luteolin, may possess potential anti-cancer properties. Moreover, these flavones that can be obtained naturally from many plant extracts have been demonstrated to have anti-inflammatory and anti-oxidant activities (Cho et al., 2004). Flavones have also been demonstrated to be agonist of peroxisome proliferator activated receptor gamma (PPARγ) and suppress activities of pro-inflammatory enzymes, including cyclooxygenase-2 (COX-2) and inducible nitric oxide synthase (iNOS) (Cho et al., 2004). Furthermore, flavonoids (flavonoids) are a class of flavonoids that have shown to possess cancer chemopreventive activity via induction of apoptosis in a diverse range of human and rat cell types (Cho et al., 2004; Woodman et al., 2004). According to Wu et al. (2010), flavonoids were able to inhibit the catalytic activities of chymotrypsin-like and trypsin-like proteasome in tumor cells. The inhibition of proteasome function leads to the accumulation of several protein targets, such as IκBα, Bax and p27, leading to growth arrest in the G1 phase of the cell cycle, and eventually induces apoptosis in tumor cells (Wu et al., 2010). Although, C. nutans has been used as primary sources of complementary and alternative healthcare for cancers in traditional medicine practice, the molecular mechanisms and cellular actions underlying its anti-cancer property remains elusive. Thus far, only the effects of methanol, ethanol, petroleum, chloroform and water extracts of the plant are investigated. Comprehensive investigation of anti-cancer activity in C. nutans extracts is necessary to discover more therapeutic values of C. nutans for human cancers and other malignancies.

In conclusion, our perspective is not only to enhance the research information of this plant, but to encourage further development of commercial products of C. nutans in this plant. As such, more studies on the molecular mechanisms and cellular actions underlying this plant are required to discover more therapeutic properties of C. nutans for human cancers and for other malignancies. Additionally, it is hoped that this perspective would draw the attention of research groups in Malaysia to further explore the potential of C. nutans in cancer therapy and subsequent product development.

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References


