Bioactive Compound and Therapeutic Value of the Some Malaysia Medicinal Plants: A Review

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There are many medicinal plants that have been used since folk ages. These plants have been recognized to have pharmaceutical properties and beneficial impact on health. This study discusses the use of ten medicinal plants in the traditional medicinal system of Malaysia and related scientific on their antioxidant activity, which demonstrate their pharmaceutical properties. The plants viewed are Andrographis paniculata, Cosmos caudatus, Eurycoma longifolia, Ficus deltoidea, Gynura procumbens, Labisia pumila, Orthosiphon stamineus, Phyllanthus niruri, Piper betle and Uncaria gambir. All the plants mentioned in this study have therapeutic properties such as antioxidation, anti-diabetics, anti-inflammation, which explains and validates their uses in traditional and modern medicine.

Key words: Antioxidant activity, medicinal plants, antimalarial, Ficus deltoidea, anti-inflammation

INTRODUCTION

Malaysia is one of the 12 mega-diverse countries identified by the United Nations Environment Programme (UNEP) as harbouring the majority of the earth’s species, which may have immense benefits for future generations. It well-endowed with natural resources in agriculture, forestry and minerals has become intention to the local and oversea researcher. Since folk ages, natures have been a medicinal source in traditional medicine and are isolated for the modern drug (Alsarhan et al., 2014). Folklore has used medicinal plant for treating gout, high blood pressure, diarrhoea and skin infection (Shafaei et al., 2014). Recently studies have indicated that the sources of antioxidant in medicinal plant have medicinal properties that give beneficial impact on health.

Halliwell and Gutteridge (1995) have defined antioxidant as “Any substance that when present at low concentration compared with those of an oxidizable substrate, significantly delays or prevents oxidation of that substrate” and Halliwell (2007) has precise the definition of antioxidant as “Any substance that delays, prevent or removes oxidative damage to a target molecule”. Oxidation is a chemical reaction that transfers electrons or hydrogen from a substance to an oxidizing. Antioxidant works to maintain the oxidant at optimum level and reduce free radical by stopping it forming before it can disrupt living cell in our body (Asad et al., 2012).

There are two type of antioxidant; synthetic antioxidant and natural antioxidant. Artificial antioxidant is a product from laboratories for food and pharmaceutical industries. It was added to food in order to prolong product shelf life and it used to enhance the stability of therapeutic against that are susceptible to chemical degradation by oxidation in pharmaceutical (Shebis et al., 2013). Synthetic antioxidant such as Butylated Hydroxy Anisole (BHA), Butylated Hydroxyl Toluene (BHT), Propyl Gallate (PG) and Tertiary Butyl Hydroquinone (TBHQ) has been discouraged use because of their toxicity and carcinogenicity and it has been restricted as they may cause live swelling and influence liver enzyme activities (Anwar et al., 2006; Tavasalkar et al., 2012).

Natural antioxidant is a product that can be taken directly from organic sources such as fruit, vegetables, grains and meat. There are two types of natural antioxidant, which is endogenous antioxidant and dietary antioxidant. Endogenous
Antioxidant is produced from our own bodies such as bilirubin, glutathione, lipico acid, N-acetyl cysteine, NADPH and NADH, ubiquinone (coenzyme Q10), uric acid and enzymes. While dietary antioxidant also known as exogenous antioxidant can be taken as supplement from plant and microalgae such as vitamin C, vitamin E, β-carotene and others carotenoids, oxyxarotenoids and polyphenols (Percival, 1998). Several types of plant material such as vegetables, fruits, leaves, oil seed, cereal crops, barks and roots, spices, herbs and crude plant drugs have been reported to have potential source of antioxidant compound like polyphenols, flavonoids and phenolic compounds (Kakhonen et al., 1999; Khalaf et al., 2008; Proestos et al., 2013). Free radicals are electrical charged molecule by means that they have an unpaired electron, which causes then to seek out and capture electron from other substance in order to neutralize itself (Percival, 1998). The production of the radical occurs continuously in all cells as part of normal cellular function. But, excess of the production of free radical play an important role in degenerative disease like cancer, cataract, immune system weakness and brain problem. It also induces nutrition medicines deterioration (Namjooyan et al., 2010; Young and Woodside, 2001). One of the sources of free radical in the body come from environmental sources, which are from cigarette smoke, pollutants, UV light, ionising radiation and venobiotics.

Polyphenols are the most abundant antioxidants in our diet and are widespread constituents of fruits, vegetables, cereals, olive, dry legumes, chocolate and beverages, such as tea, coffee and wine (Manach et al., 2004). Current studies have shown that polyphenolic mostly constituents in plant have more effective antioxidants in vitro than vitamins E or C and it might contribute significantly to the protective effects in vivo (El Gharras, 2009), because they comprise a wide variety of molecules that have a polyphenols structure (Han et al., 2007) (i.e., several hydroxyl groups on aromatic rings) but also molecules with one phenol ring, such as phenolic acids. Polyphenols are divided into several classes according to the number of phenol rings. Studies show that diets high in antioxidant reduce cancer death rates, cold and flu Infections and protect against atherosclerosis, heart disease and cataracts. It possess diverse biological properties such as antioxidant, anti-aging, anti-carcinogen, anti-inflammatory, anti-atherosclerosis, cardiovascular protection, improvement of the endothelial function as well as inhibition of angiogenesis and cell proliferation activity sources and significance (Bravo, 1998; Han et al., 2007; Manach et al., 2005). The current consensus stated that, there is evidence that phenolic substance as antioxidants by preventing LDL-lipoprotein, platelet aggregation and damage of red blood cells (El Gharras, 2009) but mostly the evidence base on the experimental (D’Archivio et al., 2007). This study discuss on the overview of antioxidant and it present in the some Malaysian medicinal plants with the research study on their pharmaceutical properties. The objective of this study is to introduce the Malaysian medicinal plant that gives benefits in the pharmaceutical industries.

**MEDICAL PLANTS HAVING ANTIOXIDANT PROPERTIES**

**Andrographis paniculata:** *Andrographis paniculata* (Burn. f.) Nees (Acanthaceae) commonly known as ‘King of bitters’ (Cui et al., 2009) is a native plant to Taiwan, Mainland China and India (Chao and Lin, 2010) (Fig. 1a). According to study from Raina et al. (2013), *A. paniculata* is distributed in tropical countries Sri lanka, India, Thailand and Peninsular Malaysia to Indonesia (Raina et al., 2013). *Andrographics paniculata* also known as Hempedu Bumi in Malaysia, herbaceous plant of family Acanthaceae and it is widely cultivated in Southern Asia. The whole plant has variety of therapeutic value and it is use traditionally as an immune system booster to treat infection in gastrointestinal tract and upper respiratory tract, in treatment of wounds, ulcers, leprosy, fever, herpes, sole throat and hypertension (Wasman et al., 2011). Now a days, this plant is used extensively as anti-typhoid, anti-fungal activity, antithrombotic, immunostimulant, antimalarial, anti-hyperglycemic, anti HIV, anti-fertility, cardioprotective, hepatoprotective, antioxidants, anti-inflammatory, anti-snake venom and antipyretic properties (Akbar, 2011; Anju et al., 2012; Ghosh et al., 2012; Ojha et al., 2009; Sivaraj et al., 2011). There were different approaches for determination of pharmaceutical properties of *A. paniculata* (Table 1).

Diterpenoids, polyphenols and flavoids are the main chemical constituents of *A. paniculata* which believe to be

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**Table 1: Pharmaceutical properties of A. paniculata**

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<thead>
<tr>
<th>Pharmaceutical properties</th>
<th>References</th>
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<tbody>
<tr>
<td><strong>Antimicrobial:</strong> (Staphylococcus aureus ATCC 25923, Escherichia coli wild type) and fungi (Candida tropicalis ATCC 750, Candida albicans ATCC 10231)</td>
<td>Chakraborty et al. (2011)</td>
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<tr>
<td><strong>Immunomodulation:</strong> Anaphylactoid potential</td>
<td>Hu et al. (2015)</td>
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<tr>
<td><strong>Antitoxicity:</strong> CYP6AA3- and CYP6P7- expressing Spodoptera frugiperda (SFP) cells to cypermethrin toxicity</td>
<td>Kotewong et al. (2014)</td>
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<tr>
<td><strong>Antiflammation:</strong> Inhibitory effect on the release of Tumor Necrosis Factor alpha (TNF-α) in the human mononuclear cell line THP-1</td>
<td>Low et al. (2015)</td>
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<td><strong>Anticancer:</strong> Action mechanisms of a purified polysaccharide (APWP) suppress the proliferation of HepG2 cells via inducing apoptosis</td>
<td>Zoa et al. (2015)</td>
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<td><strong>Antioxidation:</strong> Antioxidant action of Andrographis paniculata on lymphoma</td>
<td>Verma and Vinayak (2008)</td>
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<td><strong>Antistress activity:</strong> Effects of the treatments on stress-induced alterations in body weight, gastric ulcer, adrenal and spleen weights, depressive state and sexual behavior in male rats</td>
<td>Thakur et al. (2014)</td>
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</table>
responsible for the most biological activities (Sharma and Joshi, 2011). Three main diterpenoid lactones identified in the *paniculata* leaves were andrographolide, neondrographolide and deoxyandrographolide which are active ingredients for medicinal value of this plant (Chakraborty et al., 2011; Das and Srivastav, 2014). Among the single compound, andrographolide is the major in terms of bioactive properties (Chao and Lin, 2010). While, flavonoids mainly exist in the root but also isolated from the leaves and the aerial parts of the plant contain alkanes, ketones and aldehydes (Subramaniam et al., 2015).

**Cosmos caudatus:** *Cosmos caudatus* (Fig. 1b) is locally known as ulam raja in Malaysia is belonging to the family Asteraceae and traditional used for improving blood circulation, reducing body heat, as anti-aging agent, promoting fresh breath, treating infections associated with pathogenic microorganisms and to strengthen muscles and bones (Amna et al., 2013; Mohamed et al., 2013). It generally consumed freshly as salad or cooked by boiling with other spices. *Cosmos caudatus* have pharmaceutical properties (Table 2) such as antioxidant effects (Nurul et al., 2010), exhibits anti-mutagenics, anti-inflammatory, anti-microbial (Rasdi et al., 2010; Salehan et al., 2013), anti-fungal properties several study have indicated that it has been implicated in reduction of risk for chronic diseases such as stroke, cardiovascular disease and some cancer it due to it flavonoids content (Mediani et al., 2013). In addition, *Cosmos caudatus* showed that the antioxidant activity more than 70% and it has been found to contain phenolic, anthocyanins, ascorbic acid, β-carotene, flavoids, flavones and flavanones (Mediani et al., 2013; Mohamed et al., 2013). It is believed that phenolic compound are the main contributor of antioxidant activity in plant extract (Bunawan et al., 2014). It also rich in mineral such as calcium, phosphorus, iron, magnesium and potassium (Mohamed et al., 2013).

**Eurycoma longifolia:** *Eurycoma longifolia* (Fig. 1c), Ali’s walking stick is a small tree that grows along the hilly slopes of the rainforests of Southeast Asia, including Indonesia, Malaysia, Thailand, Laos, Cambodia and Vietnam. It commercially known as Tongkat Ali and “Malaysia ginseng” in Malaysia (Simaroubaceae) and the root is popular as traditional medicinal plant for anti-aging (Purwantiningsih et al., 2011) and as an alternative for enhance libido, energy, sport performance and weight loss (Talbott et al., 2013), it is due to *E. longifolia* stimulate release of free testosterone but it prohibited to use in sport as it enhance athletic performance. A study by George et al. (2013) have indicated that *E. longifolia* do not have doping effect. It also as health supplement for hypertension, diarrhoea, aches, persistent fever, dysentery and glandular swelling and it have demonstrate to possess medicinal values (Table 3) such as the antibacterial (Danial et al., 2013), anti-inflammatory (Varghese et al., 2013) anticoagulant for complications during child birth, aphrodisiac, anti-plasmodidal activity, cytotoxic effects, antipyretic, antiidiabetic activity, antimalarial, hepatoprotective activity, anticancer, anxiolytic and antiulcer (Mokhtar et al., 2014; Panjaitan et al., 2013; Yusuf et al., 2013). It was popular for its aphrodisiac property due to its ability to stimulate the production or action of androgen hormones, especially testosterone. Chemical compound that have been isolated from the of *E. longifolia* include eurycomanone, eurycomanol, eurycoma lactone, canthine-6-one alkaloid, 9-hydroxycanthine-6-one, 14,15 β-hydroxyklaineanone, phenolic components, tannins, quanissoids and triterpenes (Chen et al., 2014). It have been reported to be antioxidative due to its high concentration of superoxide dismutase (Effendy et al., 2012).

**Ficus deltoidea:** As an herbal tree, almost all of the parts of *Ficus deltoidea* (Fig. 1d) plant including the roots, bark, stems, leaves and fruits are believed to have medicinal properties (Table 4), which is useful for health purposes in various ailments in the Malay Archipelago (Akhir et al., 2011; Kalman et al., 2013). Traditionally, has been used in treating

### Table 2: Pharmaceutical properties of *C. caudatus*

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<tr>
<td>Antioxidation: The impact of tropical seasons (dry and wet) and growth stages (8, 10 and 12 weeks) of <em>C. caudatus</em> on the antioxidant activity and Total Phenolic Content (TPC)</td>
<td>Mediani et al. (2012)</td>
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<tr>
<td>Preventing osteoporosis: Effects of <em>C. caudatus</em> (ulam raja) on dynamic and cellular bone histomorphometry in ovariecetomised rats</td>
<td>Mohamed et al. (2013)</td>
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### Table 3: Pharmaceutical properties of *E. longifolia*

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<th>Pharmaceutical properties</th>
<th>References</th>
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<tr>
<td>Anticancer: Induce apoptosis in HepG2 cells via up regulation of p53</td>
<td>Zakaria et al. (2009)</td>
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<td>Antioxidation: Effects on cytochrome P450 (CYP) isozymes CYP1A2, CYP2A6, CYP2C8, CYP2C9, CYP2C19, CYP2E1 and CYP3A4 using in vitro assays</td>
<td>Pan et al. (2014)</td>
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<tr>
<td>Antiparasite activity: Anti- T. gondii activity of crude extract (TACME) and four fractions (TAF 273, TAF 355, TAF 191 and TAF 401) from <em>E. longifolia</em></td>
<td>Kavitha et al. (2012)</td>
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<tr>
<td>Antistress activity: Improves stress hormone profile and certain mood state parameters</td>
<td>Talbott et al. (2013)</td>
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<tr>
<td>Stimulate androgen hormones: Effects of EL extract on serum testosterone levels, bone biomarkers, biomechanical strength and gene expression of Receptor Activator of Nuclear Factor kappa-B ligand (RANKL), Osteoprotegerin (OPG) and Macrophage Colony Stimulating Factor (MCSF) in orchidecetomised rats</td>
<td>Shuid et al. (2012)</td>
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Table 4: Pharmaceutical properties of *F. deltoidea*

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<thead>
<tr>
<th>Pharmaceutical properties</th>
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<tr>
<td>Antitumoral active (in vitro)</td>
<td>Fanturi et al. (2011)</td>
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<td>Antidiabetic activity: <em>Ficus deltoidea</em> stimulates insulin secretion and blocks hepatic glucose production by regulating the expression of glucoregulatory genes in streptozotocin-induced diabetic rats</td>
<td>Kalman et al. (2013)</td>
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<td>Antioxidative properties: Measuring the ability of the samples to reduce ferric ions and to scavenge DPPH, superoxide anion, ABTS, and nitric oxide radicals</td>
<td>Misbah et al. (2013) and Olakuon et al. (2013)</td>
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<td>Anti-inflammatory: Illustrate the efficacy of the <em>F. deltoidea</em> extract towards alleviating UVB-induced photo-aging and inflammation in the skin by modulating the expression of pro-inflammatory cytokines, COX-2, MMP-1, and type I procollagen</td>
<td>Hashem et al. (2013)</td>
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<td>Antidiabetic effects: Extracts of <em>Ficus deltoidea</em> var. deltoidea and var. angustifolia on 3T3-L1 adipocytes</td>
<td>Woon et al. (2014)</td>
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Gout, high blood pressure, pneumonia, diarrhoea, skin infections and diabetes and to improve blood circulation (Shafaei et al., 2014). *Ficus deltoidea* contains at least 25 flavonoids being identified with the major constituents being flavan-3-ol monomers, proanthocyanidins and C-linked flavone glycosides. And study has found that female leaves of the plant are better than male leaves in terms of antioxidant potential (Azemi et al., 2014; Hakiman and Maziah, 2009). Another view from Aris et al. (2009) is that the fruit of *F. deltoidea* var. angustifolia sp., is a good source of antioxidant. *Ficus deltoidea* also help in wound healing by significantly accelerating the rate of wound healing (Abdulla et al., 2010a) and it has reported that the plant have antidiabetic properties (Misbah et al., 2013). The study on cytotoxicity of aqueous and ethanolic extract of *ficus deltoidea* on human ovarian carcinoma cell line indicated that the aqueous extract of the plant prompted to promote cell detachment, whereas the ethanolic extract tried to stop cell from proliferation (Akhir et al., 2011). The leaf extract were found to enhance insulin-stimulated glucose uptake.

**Gynura procumbens:** *Gynura procumbens* (Fig. 1e) is a medicinal plant belonging to the family Anacardiaceae locally known in Malaysia as Sambung Nyawa. It widely found in Borneo, Java, the Philippines and peninsular Malaysia. Usually leaves of the *G. procumbens* have been used for treatment various ailment such as fever, kidney disease, inflammation, diabetes, lowering blood pressure (Hoe et al., 2011; Ng et al., 2013). In the present study, *G. procumbens* (Table 5) were identified as anti-hyperglycaemic, anti-inflammatory, anti-plasmodial, anti-cancer, anti-ulcerogenic (Mahmood et al., 2010; Nisa et al., 2012; Vejjanan et al., 2012). A study has indicated that the leaf extract of *G. procumbens* have potential in treating wound (Zahra et al., 2011). Bioactive compound found in the plant concoction including flavoids, saponins, tannins, terpenoids and sterol glycosides.

**Labisia pumila:** *Labisia pumila* (Fig. 1f) is a small sub-herbaceous plant from the genus of the Labisia that belongs to the family Myrsinaceae L. It is most popular traditionally used by Malay woman to maintain healthy female reproductive function and as postpartum medicine (Abdullah et al., 2013). This plant is popular as effective in curing many ailments such as postpartum treatment, antiflatulence, dysentery, dysmenorrhea, gonorrhoea, rheumatism and preventing osteoporosis caused by post menopause (Al-Wahaib et al., 2008; Sanusi et al., 2013). The values of this species as protection against disease are largely influenced by its phytosterogen, anti-inflammatory and antioxidant properties. Some studies indicated that *L. pumila* has possible application (Table 6) as anti-inflammatory activity, cytotoxic agent, immunomodulatory, antioxidant, lypolytic and aphrodisiac affects (George et al., 2014; Karimi et al., 2013a). Natural bioactive compound such as resorcinols, flavonoids, saponins and phenolic acid are found in the *L. pumila* (Karimi and Jaafar, 2011; Hussain and Kadir, 2013). Other studies has indicated that isoflavonoids, benzoquinones, alkyl resoronal, triterpenoids as one of the bioactive compounds in *L. pumila* (George et al., 2014). The mechanism of anti-inflammation of *L. pumila* might be related with the bioactive compounds and phytochemicals present in plant (Karimi et al., 2013b). Among three varieties of *L. pumila*, var. *alata* had higher total antioxidant activity compared to the var. *pumila* (Norhaiza et al., 2009).

**Orthosiphon stamineus:** *Orthosiphon stamineus* (Fig. 1g) or locally known as misai kucing is one of the well-known traditional medicinal plants in several countries of Southeast Asia (particularly in Malaysia, Indonesia, Thailand, Vietnam and Myanmar) which belong to Lamiaceae family (Adnyana et al., 2013). It widely applied (Table 7) to cure cardiovascular, metabolism disorder, rheumatism, edema, jaundice, diuretic, fever, hepatitis, gall stones, eruptive, hypertension, diabetes and epilepsy (Pang et al., 2013; Ramesh et al., 2014). This plant works as antioxidant,
Table 6: Pharmaceutical properties of *L. pumila*

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<thead>
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<th>Pharmaceutical properties</th>
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<tr>
<td>Preventing osteoporosis: <em>Labisia Pumila</em> var. alata (LPva) protect bone against estrogen deficiency-induced changes by regulating the Receptor Activator of Nuclear Factor kappa-B Ligand (RANKL), Osteoprotegerin (OPG) and Bone Morphogenetic Protein-2 (BMP-2) gene expressions</td>
<td>Fathilah et al. (2013)</td>
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<tr>
<td>Time and dose-dependent effects of <em>Labisia pumila</em> on the bone strength of postmenopausal osteoporosis rat model</td>
<td>Effendy et al. (2015)</td>
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<td>Antibacterial activity: Antibacterial activities against eight bacteria (four Gram-positive and four Gram-negative bacteria</td>
<td>Karimi et al. (2015)</td>
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<tr>
<td>Antioxidation: Comparison between three varieties of <em>Labisia pumila</em></td>
<td>Karimi et al. (2015)</td>
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<tr>
<td>Antifungal activity: Plant extracts were characterized against <em>Fusarium</em> sp., <em>Candida</em> sp. and <em>Mucor</em> using the agar diffusion disc</td>
<td>Karimi et al. (2013a)</td>
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<tr>
<td>Anti-inflammatory: Using NO production by macrophage RAW 264.7 cell lines induced by LPS/IFN-g</td>
<td>Karimi et al. (2013a)</td>
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This plant consists of several active chemical compounds such as stereos, antimicrobial, antibacterial, antifungal, antitumor, antiulcer, antiviral and anti-inflammatory (Ameer et al., 2012; Amin et al., 2012; Kannappan et al., 2010).
oleanolic acid, polyphenols, terpenoids and inositol. Among these various bioactive compound present in *O. stamineus*, phenolic compounds is the most important (Abdelwahab et al., 2011). Twenty phenolic compounds have been isolated from this medicinal plants, including 9 lipophilic flavones, 2 flavonol glycosides and 9 caffeic acid derivaties (Chew et al., 2011). Other studies indicated that a wide range of flavonoids were detected in various tissues of *O. stamineus* such as rosmarinic acid, quercetin, eupatorin and sinensetin (Almatar et al., 2014).

*Phyllanthus niruri* (Linn.): Phyllanthus (Fig. 1h) species locally known as dukung anak. It has been traditionally used for treating kidney and gallbladder stones (Giribabu et al., 2014), dysentery, influenza, vaginitis, tumours, diabetes, jaundice, liver related diseases and viral infection (Njoroge et al., 2012) and it have been confirmed by a number of biochemical, pharmacological and clinical studies (Venugopalan and Geetha, 2010). These plants also known to have diverse biological activities (Table 8) such as hypoglycemic, anticarcinogenic, hypolipidemic, hepatoprotective, antiplasmodial hypotensis, diuretic, hypoglycemic, anticarcinogenic, hypolipidemic, have diverse biological activities (Table 8) such as flavoids, alkaloids, terpenoids, lignin, coumarin and saponins have been indentified from various part of *P. niruri* and extract of this plant have been proven to have therapeutic value (Bagalkotkar et al., 2006). Other studies indicate that the protective role of *P. niruri* against nimesulide-induced hepatic damage is probably because it has antioxidant property (Chatterjee and Sil, 2006). Experiment in animal models and human have shown the plant extract to possess inhibitory activity against hepatitis B-virus (Manjrekar et al., 2008) and it also demonstrate that oral administration of *P. niruri* extract could significantly protect the gastric mucosa from ulcer induction (Abdulla et al., 2010a, b).

**Piper betle**: *Piper betle* (Fig. 1i) is a tropical plant from family Piperaceae closely related to the common pepper. It is extensively grown in Sri Lanka, India, Malaysia, Thailand, Taiwan and other Southeast Asian countries. It is locally known as Sirih in Malaysia (Pradhan et al., 2013). It believed that chewing betel quid could reduce stress, strengthen teeth and maintain oral hygiene, it have been practised by old villagers for centuries chewed with slice of betel nut and lime (Haider et al., 2013; Sazwi et al., 2013). The leaves of sirih are used for treating cough, foul smelling in mouth, ozoena, bronchitis, clear throat, vulnyer and styptic. Several researchers have reported that this plant has potential (Table 9) as antioxidant, antiplague, antiabetic, anti-inflammatory, antilucer, antiplatelet aggregation, antifertility, cardiotonic, respiratory depressant, antihelminthic, cytoprotective, anti-hyperglycemic, antidermatophytic, antinaccepte, radioprotective, antimicrobial, antiproliferative (Abraham et al., 2012; Datta et al., 2011; Sripradha, 2014). Bioactive compound major in *P. betle* are polyphenols, alkaloids, steroids, saponins and tannins (Chakraborty and Shah, 2011).

**Uncaria gambir**: *Uncaria gambir* (Fig. 1j) belongs to family Rubiaceae is a native plant Southeast Asia region particularly in Malaysia and Indonesia. The plant is mainly used for the

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**Table 7: Pharmaceutical properties of *O. stamineus***

<table>
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<th>Property</th>
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<tr>
<td>Antimicrobial activity</td>
<td>Yenn et al. (2012)</td>
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<tr>
<td>Anti-inflammatory</td>
<td>Yam et al. (2009)</td>
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<tr>
<td>Antidiabetics</td>
<td>Mohamed et al. (2012)</td>
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<tr>
<td>Antioxidation</td>
<td>References</td>
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<tr>
<td>Antidengue activity</td>
<td>Suresh et al. (2015)</td>
</tr>
<tr>
<td>Anticancer activity</td>
<td>Lee et al. (2013a)</td>
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<tr>
<td>Hepatoprotective activity</td>
<td>Amin et al. (2013)</td>
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**Table 8: Pharmaceutical properties of *P. niruri***

<table>
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<th>Property</th>
<th>Reference</th>
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<tbody>
<tr>
<td>Antidengue activity:</td>
<td>Lee et al. (2013b)</td>
</tr>
<tr>
<td>Anticancer activity:</td>
<td>Lee et al. (2013b)</td>
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<tr>
<td>Hepatoprotective activity</td>
<td>Amin et al. (2013)</td>
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**Table 9: Pharmaceutical properties of *P. betle***

<table>
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<tr>
<th>Property</th>
<th>Reference</th>
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<tbody>
<tr>
<td>Antioxidation</td>
<td>Abraham et al. (2012)</td>
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<tr>
<td>Effect of <em>Piper betle</em> (PB)</td>
<td>Wan Hasan et al. (2014)</td>
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<tr>
<td>Antistress activity:</td>
<td>Sengupta et al. (2012)</td>
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</table>
treatment of wound, ulcers, asthma, headaches, gastrointestinal illness, bacterial/fungal infections, spongy gums, toothaches, cancer, cirrhosis, fevers, gastritis, diabetes, rheumatism, dysentery and inflammation of urinary tract (Andre et al., 2013). Usually leaves and young twigs are extracted to produce gambir. The activity of gambir as antioxidant has been studied with some type of mechanism and notable importance as that the antioxidant in gambir is safe. Some studies reported that this plant contains tannins namely, catechutannic acid, acacia catechin, catechu red, catechin, epicatechin and flavonoids (Isnawati et al., 2012). About 76% of gambir is catechin. polyphenol compound with flavonoid structure (Andasuryani et al., 2013). Phytochemical study showed that the major antioxidant compound contained in this plant are flavoids and pharmacological studies showed that gambir extract demonstrated some activities in preventing some damage that cause by free radical-mediated process (Ningsih et al., 2014). Previous study indicated that catechin was identified as the major bioactive compound in gambir (Anggraini et al., 2011) and is the main compound determinants of gambir quality (Kassim et al., 2011; Taniguchi et al., 2007).

CONCLUSION

In conclusion, a lot of herbal plant has given emphasis by the government because of its values and origin in Malaysia. Recently, Ficus deltoidea have been identified to meet the requirements of the market. By comparing with others medicinal plant, F. deltoidea shows a lot of beneficial values and to further study need to be done for public health purpose.

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