INTERNATIONAL RESEARCH JOURNAL OF PHARMACY
Available online http://www.irjponline.com
Review Article

PHYTOCHEMISTRY AND PHARMACOLOGICAL ACTIVITIES OF *BERSAMA ENGLERIANA* GUERKE- AN OVERVIEW

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Article Received on: 14/11/10 Revised on: 30/11/10 Approved for publication: 09/12/10

ABSTRACT

Bersama engleriana Guerke (Melianthaceae) is the synonym of the *Bersama abyssinica.* Bark, leaf and root decoctions are widely taken as a purgative to treat a range of stomach disorders, such as abdominal pain, colic, diarrhea, cholera, intestinal worms, amoebiasis and dysentery. This plant mainly contains mangiferin, swinniol, Δ4-stigmaster-3b-ol, 4-methylstigmaster-5, 23-dien-3-b-ol, sterols, flavones, phenols, triterpenes, anthraquinones, Hellebrigenin 3-acetate, hellebrigenin 3, 5-diacetate and bersaldegenin 1, 3, 5-orthoacetate. *Bersama engleriana* shows hypoglycemic, antimicrobial, antioxidant, antitumor, anti HIV activities. This review explains various traditional uses as well as phytochemical and pharmacological reports on *Bersama engleriana* which help the researcher to explode more potential of this plant.

KEYWORDS: *Bersama,* Purgative, Decoctions, Amoebiasis, Dysentery.

INTRODUCTION

During the last two decades, traditional systems of medicine and medicinal plant research have become subject of worldwide interest and consequence. In many developing nations of the world, large numbers of people still rely heavily on traditional healers and medicinal plants to meet their daily primary healthcare needs. Because of their perceived efficiency, negligible side effects in clinical experience and moderately low cost, herbal drugs are prescribed widely even when their biologically active compounds are unknown[1]. In Upaveda, Ayurveda composed around 2500 BC, deals with medicine, healthcare and treatment of disease from indigenous drugs. From Veda it is learnt that Indo-Aryans used the 'Soma' (A Plant product) as a medicinal agent, which exhibits an amazing stimulating effect[2]. Guerke belongs to Melianthaceae family. This plant is mainly found in Cameroon[3]. *Bersama abyssinica* is a poisonous and have been implicated in killing human and livestocks. *Bersama abyssinica* (*Bersama engleriana*) is distributed from Guinea Bissau through the coastal countries of West Africa except Benin, east to Eritrea and Ethiopia and south to Angola, Zambia, Zimbabwe and Mozambique. Evergreen shrub to small tree up to 12(–25) m tall; bark grey, brown or mottled, scaly. *Bersama abyssinica* grows in lowland bush savanna, gallery forests and montane forests, from sea-level up to 2700 m altitude. *Bersama abyssinica* can be propagated by seed, cuttings, wildlings or root suckers[4]. Fruits are red woody capsules[5]. In Babungo (Camroon) *Bersama abyssinica* is known as Fuaveti and Timber is used for construction purposes[6].

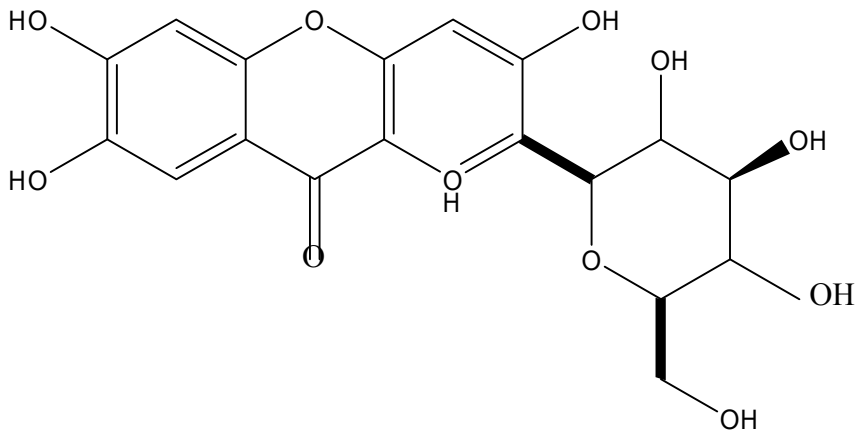
Traditional Uses

Bersama abyssinica is traditionally used to treat rheumatism[7]. *Bersama abyssinica* stem bark extract has been used as an aphrodisiac[8, 9]. Its leaves are also used to treat snake bite[10]. Bark, leaf and root decoctions are widely taken as a purgative to treat a range of stomach disorders, such as abdominal pain, colic, diarrhea, cholera, intestinal worms, amoebiasis and dysentery. Rabies, syphilis and gonorrhea are

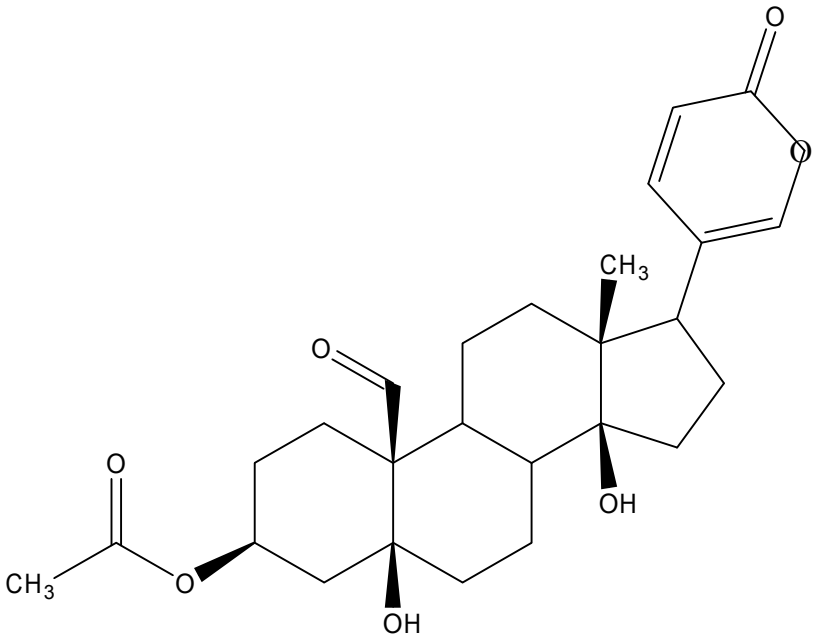
also treated with these decoctions. A stem bark decoction is drunk to cure cancer and rheumatism. As an aphrodisiac, powdered bark is added to beer or leaves are chewed. Stem bark and leaves are used to treat diabetes mellitus. Leaf decoctions are also taken to treat feverish pains, loss of appetite, debility, jaundice and leprosy. Extracts of growing shoots are used for external treatment of burns, ulcers and to clean wounds[4]. In Kenya boiled root and leaves of the plant is traditionally used in the treatment of general sexually transmitted diseases (STD) [11, 12].

Chemical Constituents

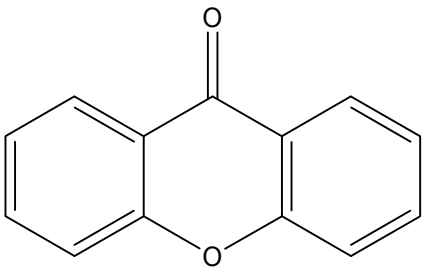
Fractionation of the CH_2Cl_2-MeOH (1:1) extract of the stem bark of *B. engleriana* afforded a xanthone C-glucoside (mangiferin) and isolation of three terpenoids swinniol, Δ4-stigmaster-3b-ol and 4-methylstigmaster-5, 23-dien-3-b-ol[3]. *Bersama engleriana* contains sugar moieties Glc (1-2) GlcA at C-3, Glc at C-28 and an aglycone moiety[13-15]. Phytochemical analysis revealed the presence of sterols, flavones and alkaloids in B. engleriana leaves[16]. The phytochemical tests indicated the presence of flavonoids, phenols; triterpenes and anthraquinones in methanol extract[17]. Hellebrigenin 3-acetate, hellebrigenin 3, 5-diacetate and bersaldegenin 1, 3, 5-orthoacetate were also isolated from *Bersama engleriana* plant[18-20]. Five 3-O-glucuronide triterpene saponins were isolated from the stem bark of *Bersama engleriana* Gurke along with two known saponins, polyscias saponin C and aralia saponin 15, and one major C-glycoside xanthone, mangiferin[21]. Stem bark also contains a mixture of cardenolides including abyssinol A, B, C, bersaldegenin, hellebrigenin, and bufadienolide-O-acetate, as well as saponins, mangiferine, and gallic acid derivatives[8, 9]. Stem bark of the plant contains oleanolic acid saponins[22, 23].



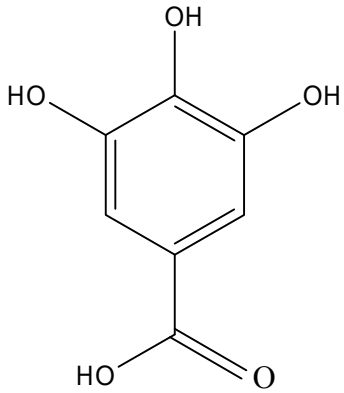
Mangiferin



Hellebrigenin 3-acetate



Xanthone



Gallic acid

Pharmacological Activities

Hypoglycemic Activity

The hypoglycemic properties of the aqueous and methanol extracts of the leaves of *Bersama engleriana* were evaluated in normoglycaemic rats in order to scientifically validate its traditional therapeutic use. With a dose of 300 mg/kg b.w. only the aqueous extract appeared to be significantly effective while at high dose, 600 mg/kg b.w., the aqueous and methanol extracts of *Bersama engleriana* reduced the blood glucose level. These results confirm the hypoglycemic properties of some extracts of the leaves of *Bersama engleriana* with the aqueous extract appearing more active[24]. Bioactive molecules present in these extracts of *Bersama engleriana* may probably possess an insulin–like effect or stimulate the pancreatic β cells to produce insulin which in turn lowers the blood glucose level. Similar observations have been reported by some others scientists also[25-27].

Antimalarial Activity

Methanol extract from *Bersama engleriana* were highly active on schizonts. Phytochemical analysis revealed the presence of sterols, flavones and alkaloids in B. engleriana leaves. One fraction and one pure product from *B. engleriana* leaves were highly active on the field parasites. *B. engleriana* was the least toxic with lower cytotoxicity than chloroquine. No acute toxicity was observed in 6N C57 BL mice for the pure products and highly active extracts[16, 28, 29].

Antitumor, antioxidant and antimicrobial activities

Methanolic extracts from the roots, stem bark, leaves and wood of *Bersama engleriana* showed antitumor, antioxidant and antimicrobial activities. The crown gall tumor and DPPH radical scavenging assays were used to detect respectively the antitumor and oxidant activities. Agar diffusion and liquid dilution were used for antimicrobial tests and the phytochemical assays were conducted according to Harbone methods. The single-dose oral toxicity test was performed in accordance with the OPPTS 870.1100 and OECD 401guidelines. Pronounced tumor reducing activity was observed with the extracts from the roots and leaves. The DPPH scavenging activity showed that the extract from the leaves was the most active. The results of antimicrobial activity showed that all tested extracts were active against all tested microbial species, including Gram-positive and negative bacteria, the two Candida species and mycobacterium. Under the conditions of the studied toxicity, all extracts were found to be non-toxic[17-20]. Hellebrigenin is the chemical constituent responsible for anticancer activity of the plant[30]. Ethanolic extract, water extract and methanolic extract of Stem bark and root bark *Bersama abyssinica* also show antibacterial activity against various bacterial strains at different concentration e.g. *Bacillus cereus*, *Neisseria gonorrhoea*, *Stretococcus pneumonia* etc[31].

Anti HIV activity

Root bark extract of *Bersama abyssinica* displayed antiviral activity at concentrations that were nontoxic to MT-4 cells. *Bersama abyssinica* displayed anti-HIV activity against both HIV-1 and HIV-2 strains[32, 33].

Excopula Ejaculatory activity

Fictive ejaculation of *Bersama engleriana* is studied in spinal male rats. Anesthetized rats treated intravenously with aqueous and methanolic extracts from the dried leaves of *B. engleriana* in the absence and presence of dopamine or oxytocin. The inhibitory effect of *B. engleriana* extracts on the expression of fictive ejaculation in spinal male rat is mediated through dopaminergic and oxytocinergic pathways. This prolonged ejaculatory latency caused by *B. engleriana* could support its potential use in patients with rapid ejaculation[34].

CONCLUSION

Major thrust by whole of the pharmaceutical industry is paying attention towards design and development of new novel and indigenous plant based drugs through investigation of leads from traditional system of medicine[35]. In recent years, ethno-botanical and traditional uses of natural compounds, especially of plant origin received much attention as they are well tested for their efficacy and generally believed to be safe for human use. The health care systems are going to become more and more expensive therefore, we have to develop technologies to essentially introduce and integrate herbal medicine system in our health care. The present review shows the pharmacological properties of various bioactive compounds present in *Bersama engleriana*.

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