Gynura nepalensis DC: A Potential Wonder Medicinal Plant

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This is a review of published studies on *Gynura nepalensis* DC, a medicinal plant locally known as Philippine Ashitaba. Although it is utilized as an ethnomedicine to cure a wide array of human sickness such as indigestion, diabetes, cuts/wounds, cough, asthma, kidney stones, urinary tract bleeding, hepatitis, gall bladder stones, hemorrhoids, constipation, diarrhea, vomiting, blood poisoning, septicemia, fertility problems, skin allergy, rheumatism, high cholesterol levels, and high-low blood pressure,only its hypolipidaemic, hepatoprotective, antimutagenic, anti-oxidant and radioprotective potentials using either ethanolic or methanolic extracts have been directly investigated based on reported studies. There are no reported studies on the antibacterial, antifungal, and cytotoxic potentials of *G. nepalensis* DC extracts using other solvents like water, DCM, DMSO, chloroform, ether, and others.Thus, many of the pharmacological claims that are based on anecdotal report need scientific validation.
Preliminary phytochemical screening of the leaf extract of the plant indicated the presence of alkaloids, tannins, flavonoids, steroid (with 2-deoxysugars), flavonoid (leucoanthocyanin), and saponin. *G. nepalensis* DC is often taken as similar with other *Gynura* spp. No molecular studies to establish the DNA barcode or fingerprint of the plant have been reported. Therefore, since many cures have been attributed to *G. nepalensis* DC, making it a potential wonder medicinal plant, the scientific community needs to conduct more researches - bioassays, molecular studies, and chemical profiling - on this plant.
Keywords: *Gynura nepalensis*, ethno-medicine, medicinal plants, phytochemistry

1 Introduction

Grierson and Long (2001) (Afroz, Uddin, & Hassan, 2014) **?** Grierson and Long (2001)

Medicinal plants are considered alternative medicines and their use in the rural communities is encouraged. As the price of synthetic medicines continues to rise, people resort to medicinal plants as cheaper alternatives hoping to get cured of their illnesses. Such decision, however, is usually based on local wisdom or folk knowledge. *Gynura nepalensis* DC is a medicinal plant with wide curative application based on ethno-medical knowledge. As such, many researchers, having recognized this wide potential, have conducted studies on *G. nepalensis* DC. This rapid review seeks to bring together the current state of research on *G. nepalensis* DC and highlight ethno-medicinal claims on *G. nepalensis* DC that have

scientific bases as reported in scientific journals. The review tried to consider available reports accessible or searchable in the internet. We searched reputable data bases such as Elsevier for published articles on G. nepalensis DC but there is a dearth of published studies. Thus, the review includes studies in refereed journals, two unpublished theses (i.e., Salas, 2016) and (San Andres, 2014) that the authors have personal knowledge of, a report presented in a scientific convention (i.e., Bustillos, Quijano, Tandigan, & Cabling, 2013), and two websites Plantlist.org and Tropicos.org for the taxonomic classification. Studies published in personal or public websites were excluded for being not peer-reviewed.

2 Distribution and Biology of *Gynura nepalensis* DC

Distribution of the Gynura species.

About 44 species of *Gynura* are distributed in Africa, South and East Asia and Australasia (Vanijajiva, 2009; **?**) Aside from *G. nepalensis* DC, a study by Vanijajiva (2009) revealed 9 species in Thailand: G. bicolor *Roxb.exWilld.* DC, *G. calciphila var. calciphila* Kerr, *G. calciphila var. dissecta* F.G. Davies, *G. cusimbua D.Don* S. Moore, *G. hmopaengensis* H. Koyama, *G. integrifolia* Gagnep, *G. procumbens Lour.* Merr.,*G. pseudochina L.* DC, and *Gynura sp.* which is claimed to be endemic in Thailand. Furthermore, **?**, in their revision of an earlier study on *Gynura* in Thailand, reported 3 additional new species, namely, *G. daviesiae*âĂĆVanijajiva & Kadereit,âĂĆ*G. villosa*âĂĆVanijajiva & Kadereit, andâĂĆ*G. siamensis*âĂĆVanijajiva & Kadereit and 3 new combinations, namely, *G. dissecta*âĂĆ*F.G.Davies* Vanijajiva & Kadereit,âĂĆ*G. annua*âĂĆ*F.G.Davies* Vanijajiva & Kadereit, andâĂĆ*G. aurantiaca*âĂĆ(Bl.) DC. *subsp. parviflora*âĂĆ*F.G.Davies* Vanijajiva & Kadereit.

Taxonomy of Gynura nepalensis DC.

According to Tropicos.org (2014), the plant of interest belongs to Class Equisetopsida, Subclass Magnoliidae, Superorder Asteranae, Order Asterales, Family Asteraceae and Genus Gynura. Its synonyms are *Gynura dielsii* H. LÃľv, *Gynura nudibasis* (H. LÃľv. & Vaniot) Lauener & D.K. Ferguson and *Senecio nudibasis* H. LÃľv. & Vaniot. *G. nepalensis* DC has several common names, to wit: *ni bo er ju san qi* in China (Tropicos.org, 2014), *Tong kribi* in Bhutan (Grierson & Long, 2001), and Philippine Ashitaba in the Philippines (Gracilla & Bagunu, 2014).

Morphological Description of Gynura nepalensis DC.

Based on various sources, Vanijajiva (2009) provides the following morphological description of G. nepalensis DC, which is quoted in full here: âĂIJPlants 2âĂŞ5 m high or more, stems erect, densely white- or tawny-tomentose, roots fibrous. Blades elliptic, narrowly elliptic, rhomboid or lyrate, 2âĂŞ20 x 1âĂŞ6 cm, densely tomentose, base cuneate, apex acute, margins entire to denticulate. Petioles 0.5âĂŞ5 cm, exauriculate, tomentose. Capitula 3âĂŞ7 per corymb, peduncles stout, 2âĂŞ10 cm long; calycular bracts 3 -8, 3âĂŞ7 mm long, densely tomentose; involucres 8âĂŞ12 mm long, 7âĂŞ12 mm in diam.; phyllaries 13âĂŞ14, 8âĂŞ10 mm long, 1âĂŞ2 mm broad, densely tomentose or sometimes glandular. Florets 25âĂŞ40, orange to yellow, 9âĂŞ15 mm long, exserted part 2.5âĂŞ4 mm long. Anthers 2.5 mm long, anther collars elongate. Style arms 3.5 mm long.Cypselas

4âĂŞ6 mm long, brown, pilose; carpopodium cylindrical, yellowish; pappus 10âĂŞ12 mm long, white or dirty-white.âĂİ

Phenology, ecology and distribution of* Gynura nepalensis *DC

In terms of phenology, "the plant is flowering and fruiting all year round" according to Vanijajiva (2009) but Afroz et al. (2014) reported its phenology from March to August. Ecologically, it grows "at the edge and in open places of mountain forests, 700-4500 malt" (Vanijajiva, 2009). It is native in Nepal and distributed in India, Bhutan, China, Myanmar, Thailand, and Bangladesh (Vanijajiva, 2009; Afroz, Uddin & Hassan, 2014). In the Philippines the plant is also distributed but Ursulom & Rialubin (2013) reported that the Ashitaba grown in the country is *G. nepalensis* DC, which they wrote is also called *G. procumbens* and *G. acutifolia*. These three names, however, actually represent three different emphGynura species.

3 Ethnomedicinal Use

Gynura nepalensis DC is used to cure many human diseases.

Indigestion.

The leaf extract of G. nepalensis DC is one of the 40 ethnomedicinal plants used to treat indigestion by the members of the Apatani tribe, in the Ziro Valley of Arunachal Pradesh, one of the 28 states in Northeast India and also considered the 12th mega biodiverse regions of the world (Kala, 2005).

Diabetes.

The use of G. nepalensis DC leaves to treat diabetes has been reported in Bangladesh (Afroz, Uddin, & Hassan, 2014) and in the Philippines (Ursulom & Rialubin, 2013).

Cuts and Wounds.

G. nepalensis DCâĂŹs juice is used to heal cuts and wounds in Nepal (Manandhar, 2002, cited in Afroz, Uddin, & Hassan, 2014) and external wounds in the Philippines (Ursulom & Rialubin, 2013).

Array of Diseases.

Ursulom & Rialubin (2013) reported that G. nepalensis DC and Angelica keiskei Koidzumi, which they seem to suggest to be the same, can treat an array of diseases including âĂIJcough, asthma, kidney stones, urinary tract bleeding, hepatitis, gall bladder stones, hemorrhoids, constipation, diarrhea, vomiting, blood poisoning, septicemia, fertility problems, skin allergy, rheumatism, high cholesterol levels, high-low blood pressure.âĂİ In addition, it can also suppress further cancer cell growth, help bring about balanced blood cells and aid in bone injury recovery. The plant part used for the treatment of the enumerated diseases is the leaf, which can be âĂIJboiled, dried, pounded and mixed with oil and applied as poultice.âĂİ Alternatively, 1 or 2 leaves can be eaten raw for prevention and 2 or more leaves for treatment, after rinsing the same with water and salt. The citations or references for the above long list of claims, however, cannot be found in the âĂIJliterature citedâĂİ section of the paper. In their interview of 50

users, Ursulum & Rialubin (2013) reported that âĂIJthe most dominantbeneficial effect [of using G. nepalensis DC] is giving a lighter and healthier feeling, while the least are aiding indialysis, treating pharyngitis, goiter, and pain in nipples; thus, it is a health enhancer,medicine and good for health maintenance.âĂİ

Ethnopharmacological studies on Gynura nepalensis DC.

Several studies on the pharmacological potentials of G. nepalensis DC have already been published. However, some studies tend to be indirect insofar as findings on other Gynura species are applied (or generalized) to G. nepalensis DC.

4 Studies on Gynura nepalensis DC

Direct Studies.

- Hypolipidaemic and Hepatoprotective Activity. Nigam, Paarekh, Singh, Goyanar, Upmanyu, & Banweer (2012) have established the hypolipidaemic and hepatoprotective activity of the aqueous flower extract of G. nepalensis DC on Streptozotocin-induced diabetic mice, at doses of 100 mg/kg and 200 mg/kg b.w., respectively. After 21 days of extract administration, they observed significant reduction in serum cholesterol and triglyceride levels, significant decrease in HDL, and significant increases in LDL and VLDL in the experimental animal group. Significant increases in hepatic enzyme levels, namely, Serum Glutamate Pyruvate Transaminase (SGPT), Serum Glutamate Oxaloacetate Transaminase (SGOT), and Alkaline Phosphatase (AP), were significantly reduced after 21 days of treatment with the extract.

- Radioprotective Activity. Gracilla and Bagunu (2014) reported the radioprotective potential of the methanolic leaf extract of G. nepalensis DC. At 100

- Antimutagenic Activity. Bustillos, Quijano, Tandigan and Cabling (2013) have determined the antimutagenic activity of G. nepalensis DC using micronucleus assay.

- Phytochemicals in Gynura nepalensis DC. Phytochemical screening on the Ethanolic leaf extract of G. nepalensis DC [conducted in Pampanga State Agricultural University] indicated the presence of alkaloids, tannins and flavonoids (Sales, 2014). Another phytochemical screening of the Ethanolic leaf extract of G. nepalensis DC revealed the presence of primary alkaloids, steroid (with 2-deoxysugars), flavonoid (leucoanthocyanin), saponin and tannin (San Andres, 2014). According to Tiwari, Kumar, Kaur, Kaur, & Kaur (2011) alkaloids and tannins have antimicrobial, anthelminthic and antidiarrheal activity; flavonoids have antimicrobial and antidiarrheal activity; and, saponins have antidiarrheal activity.

Indirect Studies.

- Based on Gynura procumbens and Gynura divaricata. Gracilla and Bagunu (2014) stated that âĂIJthe ethno-pharmacological âĂę and phytochemical properties of Philippine Ashitaba (Gynura nepalensis D.C.) have been establishedâĂİ and that the extractâĂIJcontains alkaloids, catechic tannins, saponins and flavonoidsâĂęâĂİ

These statements, however, are based on two studies which were conducted on G. procumbens (Hassan, Yam, Ahmad, & Yusof, 2010) and G. divaricata (Wan, Yu, Zhou, Liu, Tian, & Cao, 2011). These plants, however, belong to different species of Gynura.

- Based on Angelica keiskei Koidzumi. Ursulom and Rialubin (2013) also reported that some studies have shown that G. nepalensis DC and Angelica keiskei Koidzumi, which they suggest to be the same, are âĂIJanti-oxidant, anti-cancer, anti-aging, anti-inflammatory, antihypertensive, and antidiabeticâĂİ. The authors [Ursulom and Rialuben (2013)]cited three studies on Angelica keiskei Koidzumi, which is also called Ashitaba in Japanese. These three Japanese studies reported the potential of A. keiskei Koidzumi extract âĂIJto improve insulin resistance and hypertriglyceridemia in rats fed with high-fructose drinkâĂİ (Ohnogi, Kudo, Tahara, Sugiyama, Enoki, Hayami, Sagawa, et al., 2012), âĂIJto produce[s] elevation of serum HDL levels and a reduction of liver triglyceride levels in stroke-prone spontaneously hypertensive rats (SHRSP)âĂİ (Ogawa, Nakashima, & Baba, 2003), and âĂIJto promote anti-tumor activityâĂİ (Okuyama, Takata, Takayasu, Hasegawa, Tokuda, Nishino, Nishino, & Iwashima, 1991). These studies, however, were conducted specifically on A. keiskei Koidzumi and not on G. nepalensis DC. Thus, there seems to be an attempt to generalize the findings on A. keiskei Koidzumi to G. nepalensis DC.A.keiskei Koidzumi belongs to the carrot FamilyApiaceae(carrot)(http://www.theplantlist.org) while G. nepalensis DC belongs to Family Asteraceae /Compositae (http://www.tropicos.org; http://www.theplantlist.org). These two plants are separate species.

- Extraction Solvents used. Several solvents are used to extract the bioactive components of medicinal plants. The ability of these solvents depends on their polarity.Tiwari, Kumar, Kaur, Kaur, & Kaur (2011) reported the phytochemicals that specific solvents can extract, to wit: water âĂŞ anthocyanin, starches, tannins, saponins, terpenoids, polypeptides, and lectins; ethanol âĂŞ tannins, polyphenols, polyacetelenes, flavonols, terpenoids, sterols, and alkaloids; methanolâĂŞ anthocyanins, terpenoids, saponins, tannins, xanthoxyllines, totarol, quassinoids, lactones, flavones, phenones, and polyphenols; chloroform âĂŞ terpenoids and flavonoids; ether âĂŞ alkaloids, terpenoids, coumarins and fatty acids; and, acetone âĂŞ phenol and flavonols. So far, published studies on G. nepalensis DC have used either ethanol or methanol as extraction solvents.Both ethanol and methanol are polar protic solvents.Thereis no report on the use of other solvents such as water, DCM, DMSO, acetone and others.

5 Conclusion and Recommendation

The review presented here has yielded several observationsfor the following conclusions. As a medicinal plant, Gynura nepalensis DC appears to have great potentials as it is claimed to be able to cure a lot of diseases. However, the scientific bases for many of these âĂIJcuresâĂİ are not yet well established. G. nepalensis DC is confused with other species particularly G. procumbens. But insofar as G. nepalensis DC is a different species, applying the findings of other species on G. nepalensis DC should be approached with

cautionas this needs further validation. So far, there is no published study on the antibacterial, antifungal, and cytotoxic potentials of the plant. Furthermore, the usual extraction solvent used in published studies reviewed hereis either methanol or ethanol. Thus, other solvents need to be used to validate the presence of other phytochemicals in G. nepalensis DC.No molecular studies on any of the Gynura species have been published or can be found in the literature available or searchable in the internet. It is safe to conclude that no DNA barcoding or fingerprinting studies have been undertaken.
The scientific community needs to address the gaps identified in this review. More bioassays need to be conducted on G. nepalensis DC involving extraction solvents other than ethanol and methanol to scientifically validate the pharmacological claims on this plant. Alternatively, bioassays already conducted on G. nepalensis DC should be reported to the scientific community through publication in national or international journals. Molecular studies for DNA barcoding or fingerprinting of the various Gynura speciesand the chemical profiling of G. nepalensis DC are hereby recommended.

References

Afroz, S., Uddin, M., & Hassan, A. (2014). *Gynura nepalensis* dc.(asteraceae) - a new angiosperm record for bangladesh. *Bangladesh Journal of Plant Taxonomy*, *21(1)*, 101–104.

Grierson, A., & Long, D. (2001). Flora of bhutan. rgob and rbge. Retrieved 10/16/2014, from http://biodiversity.bt/species/show/1296

Vanijajiva, O. (2009). The genus gynura (asteraceae: Senecioneae) in thailand. *Thai Journal of Botany*, *1(1)*, 25âĂŞ36. Retrieved from http://qsbg.or.th/bot/pdf/article/article-y2552-v38-n38-23-12-2010-9-25-897.pdf