

Green chiretta (*Andrographis paniculata*) as medicinal herb

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Abstract

Green chiretta (*Andrographis paniculata*) is an annual herbaceous plant and is extensively cultivated in Southern Asia, China and some parts of Europe. Moist shady places, forests, and wastelands are preferable for their well development. This plant grows abundantly in Southern and Southeastern Asia including India, Java, Sri Lanka, Pakistan, and Indonesia, while it is cultivated in India, China, Thailand, Brunei, Indonesia, the West Indies such as Jamaica, Barbados, and Bahamas, Hong Kong, and the tropical areas in America and also in southwestern Nigeria. In traditional medicine, *A. paniculata* is widely used to get rid of body heat, dispel toxins from the body; prevent common cold, upper respiratory tract infections including sinusitis and fever and as an antidote against poisons of snakes and insects. *Andrographis* leaf and stem might work by stimulating the immune system. It might also prevent flu viruses from binding to cells in the body. The plant has been reported to exhibit various mode of biological activities in vivo as well as in vitro viz., antibacterial, antiviral, anti-inflammatory, anti-HIV (Human immunodeficiency virus), immunomodulating/ immunostimulatory and anticancer. The plant showed potential therapeutic action in curing liver disorders, common cough and colds in human. The presence of important phytochemicals in *A. paniculata* makes the plant useful for treating different ailments and has a potential of providing useful drugs of human use. The quantitative determination of pharmacognostic parameters will help for setting standards for crude drugs.

Keywords: *Andrographis paniculate*, *A. serpyllifolia*

Introduction

Importance of Green Cheetah by Different Scholars

Andrographis paniculata (Burm. f.) Wall. ex Nees. (Family-Acanthaceae) (English name-King of Bitters, Tamil name-Nilavempu) is an annual herbaceous plant and is extensively cultivated in Southern Asia, China and some parts of Europe. In traditional medicine, *A. paniculata* is widely used to get rid of body heat, dispel toxins from the body; prevent common cold, upper respiratory tract infections including sinusitis and fever (Gabrielian *et al.*, 2002) [8] and as an antidote against poisons of snakes and insects (Samy *et al.*, 2008) [25]. The plant has been reported to exhibit various mode of biological activities in vivo as well as in vitro viz., antibacterial (Singha *et al.*, 2003) [29], antiviral (Wiert *et al.*, 2005) [34], anti-inflammatory (Wen *et al.*, 2010) [33], anti HIV (Human immunodeficiency virus) (Chao *et al.*, 2010) [5], immunomodulating/ immunostimulatory (Calabrese *et al.*, 2000) [4] and anticancer (Iruetagoiena *et al.*, 2005) [10]. The plant showed potential therapeutic action in curing liver disorders, common cough and colds in human (Geethangili *et al.*, 2008) [9]. Among traditional medicinal species, *Andrographis paniculata* (King of bitters /Hempedu Bumi) is an herb of Acanthaceae family commonly used to cure many ailments and diseases (Kumar *et al.*, 2004) [16]. Every part of the plant has its therapeutic value. Especially leaves (fresh and dry) of *A. paniculata* are extensively used in Asian traditional medicines and in various herbal combinations (Srivastava *et al.*, 2004).



Fig 1: Plant Green chiretta with flower for Health Benefits

In recent studies, *Andrographis* (AG) has shown activity against HIV virus in vitro (Calabrese *et al.*, 2000) [4]. Neoandrographolide has also shown activity against malaria and various liver disorders (Kapil *et al.*, 2001).

In India, *A. paniculata* is known as “Kalmegh”; in China it is known as “Chuan-Xin-Lian”; in Thailand it is known as “Fah Tha Lai”; in Malaysia it is known as “Hempedu bumi”; in Japan it is known as “Senshinren”; and in Scandinavian countries it is known as “green chiretta” (Kumar *et al.*, 2004) [16].

Extracts of this plant and andrographolide exhibit pharmacological activities such as those that are immunostimulatory (Kumar *et al.*, 2004) [16], antiviral (Calabrese *et al.*, 2000) [4], and antibacterial (Singha *et al.*, 2003) [29]. As major active constituent, andrographolide exhibits a broad range of biological activities, such as anti-inflammatory, antibacterial, antitumor, antidiabetic, antimalarial, and hepatoprotective (Jarukamjorn and Nemoto, 2008) [11].

A. paniculata plays an important role in Siddha, Ayurvedic and Traditional systems of medicine in India (Maiti *et al.*, 2006) [17]. Flavonoids, including 5, 7, 2', 3'-tetramethoxyflavanone, as well as several other flavonoids, andrographolide diterpenoids, and polyphenols were obtained from the whole plant of *A. paniculata* (Koteswara *et al.*, 2004) [15]. Several other compounds, like androechin, a new chalcone glucoside from *A. echinoides* (Jayaprakasam *et al.*, 2001) [12], a flavone glycoside from *A. alata*, two new 20-oxygenated flavones from *A. elongata* (Jayaprakasam *et al.*, 2001) [12], and two acylated flavone glycosides from *A. serpyllifolia* have also been reported. Six new compounds were isolated from the aerial parts of *A. paniculata* (Shen *et al.*, 2006) [27].

The presence of important phytochemicals in *A. paniculata* makes the plant useful for treating different ailments and has a potential of providing useful drugs of human use. The quantitative determination of pharmacognostic parameters will help for setting standards for crude drugs (Sharma *et al.*, 2012) [26].

An antioxidant is a molecule capable of terminating the chain reactions that damage cells by removing free radical intermediates, and inhibit other oxidation reactions by thereby reducing stress responsible for many degenerative disorders. *Andrographis paniculata* Nees, a multipurpose tropical plant is believed to have antioxidant properties (Mishra *et al.*, 2013) [18].



Fig 2: Green chiretta Flower for Herbal Utility

The Indian pharmacopoeia narrates that it is a predominant constituent more than 26 ayurvedic formulation. In traditional Chinese medicine, it is an important “cold property” herb used to relieve the body of heat, as in fevers and to dispel toxins from the body. It is commonly used to prevention and treatment of the common cold in Scandinavian countries (Zhang, 2004) [36]. *Andrographis* was selected by the ministry of public health as one of the medicinal plants to be included in “the national list

of essential drugs A.D. 1999 in Thailand (Pholphana *et al.*, 2004) [23].

Recent research has revealed that *A. paniculata* has a surprisingly broad category of pharmacological activity and some of them are enormously beneficial, such as Anti-inflammatory (Chiou *et al.*, 2000) [6], Antidiarrhoeal, Antiviral, Antimalarial, Hepatoprotective, Anticancer, and Immunostimulatory activities (Calabrese *et al.*, 2000) [4]. On the other hand, male reproductive toxicity (Akbarsha and Murugaian, 2000) [2] and cytotoxicity (Nanduri *et al.*, 2004) [19] of the plant andrographis has been reported.

A. paniculata is an annual herb found in Sri Lanka, Pakistan, Java, Malaysia, Indonesia and throughout India, specifically in Maharashtra, Karnataka, Uttar Pradesh, Tamilnadu, Andhra Pradesh and Madhya Pradesh. It is cultivated to some extent in Assam and West Bengal (Kokate *et al.*, 2006) [14].

The flowers of plant are of white colour. The seeds are small in size of yellowish brown in colour. The test is of plant is extra bitter that's why it is called as “King of Bitters” (Akbar, 2011) [1]. *A. paniculata* has been reported as having antibacterial, antifungal, antiviral, choleric, hypoglycemic, hypocholesterolemic, and adaptogenic effects (Das *et al.*, 2013) [7].

Andrographis paniculata (Burm. f.) Wall. ex Nees (AP) is an important medicinal plant and widely used around the world. It belongs to the family Acanthaceae. AP is used as a traditional herbal medicine in Bangladesh, China, Hong Kong, India, Pakistan, Philippines, Malaysia, Indonesia, and Thailand (Akbar, 2011) [1] and is ethnobotanically used for the treatment of snake bite, bug bite, diabetes, dysentery, fever, and malaria. In the Unani and Ayurvedic medicines, AP is one of the mostly used medicinal plants (Akbar, 2011) [1]. In recent times, commercial preparations of this plant extracts are also used in certain countries. However, the preparations yet need to be standardized for their better efficacy. The aerial part of AP is most commonly used; its extracts contain diterpenoids, diterpene glycosides, lactones, flavonoids, and flavonoid glycosides. Whole plant leaves and roots are also used as a folklore remedy for different diseases in Asia and Europe (Akbar, 2011) [1]. AP has been reported to have a broad range of pharmacological effects including anticancer (Kumar *et al.*, 2011), antidiarrheal, antihepatitis, anti-HIV (Nanduri *et al.*, 2004) [19], antihyperglycemic (Yu *et al.*, 2003) [35], anti-inflammatory (Chiou *et al.*, 2000) [6], antimicrobial, antimalarial (Kamdem *et al.*, 2000) [13], antioxidant (Singh *et al.*, 2001) [28], cardiovascular (Tan and Zhang, 2004) [36], cytotoxic (Nanduri *et al.*, 2004) [19], hepatoprotective (Trivedi *et al.*, 2000), immunostimulatory (Calabrese *et al.*, 2000) [4], and sexual dysfunctions (Akbarsha and Murugaian, 2000) [2].

A. paniculata is an important medicinal plant of *Andrographis* genus. A total number of species of this genus varied in different reports, which comprises either 19 (Patidar *et al.*, 2011) [22], 28 (Niranjan *et al.*, 2008), 40 (Boopathi, 2000) [3], or 44 (Parixit *et al.*, 2012) [21] species. The exact numbers of species of *Andrographis* genus are not validated yet. Total number of chromosomes of AP is 25 and 50 in gametophytic (Bhattacharya *et al.*, 2012). In addition, genotypic differences are important considerations to find out high yielding germplasm. *A. paniculata* is an annual, branched, erect, and herbaceous plant which grows in hedgerows throughout the

plane lands, hill slopes, waste ground, farms, moist habitat, sea shores, and roadsides. It also can be cultivated in garden.

Moist shady places, forests, and wastelands are preferable for their well development (Niranjan *et al.*, 2008). This plant grows abundantly in Southern and Southeastern Asia including India, Java, Sri Lanka, Pakistan, and Indonesia, while it is cultivated in India, China, Thailand, Brunei, Indonesia, the West Indies such as Jamaica, Barbados, and Bahamas, Hong Kong, and the tropical areas in America and also in southwestern Nigeria (Jarukamjorn and Nemoto, 2008) [11].

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