



Chemical Composition and Pharmacology of a Medicinal Herb: Swertia Chirata

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Abstract

Swertia chirata is used as folkore medicine in the treatment of mental disorders ulcers, liver disorder, febrifuge, anthelmintic, antimalarial, skin diseases etc. Phytochemical screening of the extract prepared by soxhlet apparatus confirmed the presence of broader range of bioactive chemical constituents like steroids, tannins, phenolics, saponins, alkaloids, flavonoids, and glycosides. So, the present review based on whole literature available about the medicinal plant was designed to describe the whole work which is carried out about the *Swertia chirata*. We have also summarized the possibilities of carrying out of unexplored work on the plant in the future.

Keywords: Febrifuge; Soxhlet; Steroids; Alkaloid; Flavonoid

Introduction

Medicinal plants are a major source for active chemical constituents like alkaloids, flavonoids, steroids, saponins etc which are used for design and development of drugs. According to the present survey, there are about half million unexplored plants around the world as reported by Bassam, et al. [1]. Boon, et al. [2] reported that according to WHO has survey, about 80% of world population relies on medicines extracted from the plants used especially for the primary health care. Traditionally in past times, it was a common perception to use the natural medicinal plants without any harm full effects as quoted by Haq, et al. [3]. Studies based on Experimental animal studies on *Swertia chirata* documented the efficacy in a large number of diseases such as diabetes by Thomson, et al. [4], hypertension- Susanna, et al. [5], analgesic

and anti-inflammatory Das, et al. [6], anticarcinogenic-Sahaet, al. [7], anticonvulsant, sedative and anxiety-Mahendran, et al. [8], antioxidant-Nag, et al. [9], antipyretic-Bhargava, et al. [10], anti-bacterial, antiviral- Verma, et al. [11], antiulcer-Rafatullah, et al. [12], anti-helminthic-Iqbalet, al. [13], anti-hyperlipidaemic- Dhande, et al. [14] and hepatoprotective effect-Chenet, et al. [15]. This plant was first time bringing into notice by Joshi, et al. [16] in Britain and was admitted to the Edinburgh Pharmacopoeia. Kirtikar, et al. [17] Clarke, et al. [18] mentioned that the plant is a native of temperate Himalayas, distributed from Kashmir to Bhutan. The whole plant constitutes the potent chemical constituents and has been used by the Aurvedic physicians as a bitter tonic. Edwards, et al. [19] quoted it as an annual plant (Figure 1).



Figure 1: Image of *Swertia chirata*.

Chemical constituents of Chirata

Prasad, et al. [20], reported some important chemical constituents of *S. Chirata* like Ophelic acid, chiratin and amarogentin which are bitter glucosides. Another new xanthone swerchirin which is neutral and yellow crystalline. Out of all these bitter compounds amarogentin is one of the bitterest substances. The herb contains swertanone, swertenol, episwertinol, chiratenol, gammacer-16-en-3 β -ol, 21-a-H-hop-22(29)-en-3 β -ol, taraxerol, oleanolic acid, ursolic acid, swerta-7, 9 (11)-dien-3 β -ol, and pichierenol, besides β -amyrin, γ -taraxasterol, lupeol and erythrodiol. It also yields, 1,3,6,7-tetrahydroxyxanthone-C-2- β -D-glucoside (mangiferin) having a significant immunomodulatory potential. A new xanthone, 1,5-dihydroxy-3,8-dimethoxyxanthone

(chiraton) besides swerchirin and 7-O-Me swertiarin and monohydroxy terephthalic acid and 2,5-dihydroxy terephthalic acid were isolated from the herb which was reported by Chakravarty, et al. [21] (Figure 2). The herb also yields the alkaloids gentianine, gentiocrucine and enicoflavine and xanthenes like chiratanin- a novel dimeric xanthone, 1,5,8-trihydroxy-3-methoxyxanthone, 1-hydroxy-3,5,8-trimethoxyxanthone, 1-hydroxy-3,7,8-trimethoxy xanthone, 1,8-dihydroxy-3,5-dimethoxy-xanthone, 1,8-dihydroxy-3,7- dimethoxy xanthone, 1,3,6,7-tetrahydroxy xanthone C-2- β -D-glucoside (mangiferin), 1,3,8-trihydroxy-5-methoxy xanthone, 1,3,5,8-tetrahydroxy xanthone and 1,3,7,8-tetrahydroxy xanthone as mentioned by Asthana, et al. [22].

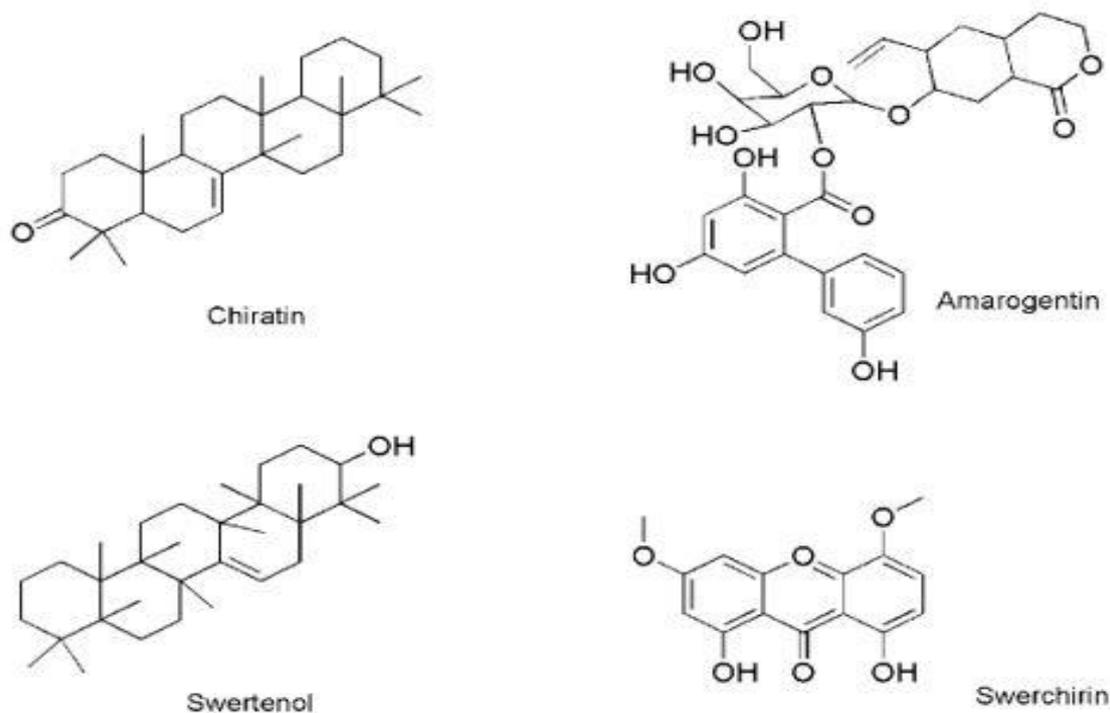


Figure 2: Chemical Structure of some selected compounds from *Swertia Chirata*.

Biological activities

The methanolic extraction of different parts of the *Swertia chirata* plant was phytochemically screened to various biological activities like antimicrobial, anticancer, anti-inflammatory etc. The extract was found contain highly potent molecules like alkaloids and flavonoids to show effective results of these pharmacological activities. Because of these activities, the extracts formed of different parts of the plant which were screened confirmed the presence of active

constituents in the plant particularly in its stem and leaves.

Conclusions

In this review, a detailed and reported chemical constituents and biological activities are described. The plants extract particularly methanolic extract is found rich in flavonoids, alkaloids, terpenoids and saponins etc which are found highly effective for carrying out the different biological activities. The

main aim of this review is to present and highlight the chemical composition of the medicinal plant *Swertia chirata*. In future, the isolation of active chemical constituents can be the work of target. The biological activities can be enhanced by carrying out structural modifications of active moieties. Also, the isolated constituents can be made applicable for the chemosensing of metal ions.

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