

**SWERTIA CHIRAYATA: AN AYURVEDIC HERB AND ITS MEDICINAL USES****Sharma Gajendra Kumar<sup>1</sup>, Nishtha Dubey<sup>2</sup>**<sup>1</sup>B.A.M.S., M.D.(Dravya Guna), Ph.D.(Ayu.), Associate Professor, Deptt.Of Dravya Guna, M.L.R. Ayurveda College Charkhi Dadri, Distt. Bhiwani, Haryana, India<sup>2</sup>Sr.Ayurveda and wellness consultant, Palam vihar, Gurgaon, Haryana, India**ABSTRACT**

Biological Name: Swertiachirayata, Gentianachirayita ;Family : Gentianaceae ;Indian Name : Chirayata

So far literature surveyed, Swertiachirayata has tremendous uses in traditional medicines. It has anti-microbial activity against Gram positive and Gram negative bacteria. It is best known as the main ingredient in Mahasudarshanachurna, a remedy for fever containing more than 50 herbs. The plant is used as a bitter tonic in gastrointestinal disorders, like dyspepsia/anorexia, it is used as digestive, febrifuge and laxative. The plant is also effective against intestinal worms, bronchial asthma, regulating the bowels. The whole plant is an excellent drug for intermittent fevers, skin diseases. The root of the plant is useful in checking hiccups and vomiting. It is used in the liquor industry as a bitter ingredient. A wide range of chemical compounds including chiratin, xanthones, glucosides, amarogentin, have been isolated from the species. Its extracts have been found to possess various pharmacological activities. Below, we give a comprehensive review of its pharmacological profile, biochemistry, ethnomedical uses, chemical constituents, as a medicinal plant. This is an attempt to compile and document information on different aspects of S. chirayata and highlight the need for research and development. Particular attention is given to its hepatoprotective, antipyretic, digestive, antidiabetic effects so that its potential uses in pharmaceuticals can be better evaluated.

**Key words:** Laxative, Chiratin, glucosides, amarogentin, hepatoprotective, antipyretic

**INTRODUCTION**

Traditional systems of medicines have always played important roles in meeting global healthcare needs. They continue to do so today and will also play major roles in the future. Systems of medicine considered Indian in origin, or systems of medicine which have come to India from abroad and been assimilated into Indian culture are collectively known as Indian Systems of Medicine (ISM). Among them, Ayurveda has been practiced for thousands of years. Consider-

able research on the pharmacognosy, chemistry, pharmacology, and clinical therapeutics of Ayurvedic medicinal plants has been carried out. Natural products, including those from plants, animals, and minerals have been the basis of its treatment of disease. The current dominant system, modern medicine or 'Allopathic' has gradually developed and over the years come to be accepted through scientific research and observation. However, the ultimate basis for its

development lies in traditional medicine and therapies.

In explaining medicinal plants, Rigveda dates them back three yugas prior to the existence of animal life on earth. This indicates the importance it attributed to medicinal plants. Ayurvedic texts, from the Samhitas to the Nighantus, identify about 2000 species of plants and explain their properties. But India's 4,635 ethnic communities include one million folk healers using an estimated 8000 or more species of medicinal plants. Their rural households have little or no financial means to buy drugs off the shelf for medical care. Such folk medicines are the first response to simple ailments. Their economic and therapeutic potential makes standardization, documentation, and conservation of medicinal plants of vital importance.

Selecting the right scientific and systematic approach to biological evaluation of plant products, based on their use in traditional medicine is the key to ideal development of new drugs from plants. One such plant is swertia Chirayata. S. chirayata is a therapeutic plant and its remedial usage has been recognized in the Indian pharmaceutical codex as well as the British and American Pharmacopoeias. The curative value of the herb has been recorded and explained by the ancient Indian herbal medicine system Ayurveda and other conventional medical systems. S. chirayata exhibits hypoglycaemic activity. It is an effective drug for reducing fevers. It is especially beneficial in the treatment of malarial fevers. The herb is remarkable for its properties in the removal of all kinds of intestinal worms. (4)

Swertiachirayata has an established market, both domestic in India as well as globally

and it is expanding at the rate of around 10 per cent every year.

#### **Morphological description:**

The plant is an erect annual. The stems are robust, branching, cylindrical below and 4-angled upwards, containing a large pith; the leaves are broadly lanceolate in diametric pairs, nearly 10 cm long, 5-nerved, sharpened at the tip and sub-sessile. The plant bears plenty of flowers occur in large panicles, are lurid greenish yellow, tinged with purple with long white or pink hairs and minuscule sharply pointed fruits; the capsules are egg-shaped, many-sided, sharp-pointed; the seeds are smooth and many-angled. The entire plant, plucked in its blooming stage and dried, makes up the drug.

#### **Habitat and Cultivation**

The chirayata thrives as well as flourishes in woodland gardens having a sunny edge, partial shade, in shade as well as in marshy lands. It is an annually growing plant that normally grows up to a height of three feet or one meter. The plants are in bloom between the period September and October. The flowers are greenish in color with a purple tinge and hermaphrodite in nature. In other words, the chirayata flowers possess both the male and female organs. This plant has a preference for sandy (light), loamy (medium) as well as clay (heavy) soil conditions. In addition, the chirayata plant thrives and flourishes well in acidic, neutral as well as basic or alkaline soils. The plant can grow well in semi-shade or somewhat woodland conditions and needs humid or damp soil. Precisely speaking, the plant thrives well in a humid and humus-rich soil in damp light woodlands along the streams or in marshlands. The plant actually develops best in areas where the summers are cool. Hence, it

is no surprise that the chirayata can thrive and flourish both in conditions where there is full sunlight as well as partial shade. The chirayata plants are able to withstand temperatures as low as  $-15^{\circ}\text{C}$  and still continue to grow well. *S. chirayata* is propagated by its seeds. Sowing is generally done during the spring when the temperature is not above  $10^{\circ}\text{C}$  and in a situation when the soil contains plenty of humus. When the seedlings have grown adequately to be handled, they are taken out individually and planted into separate pots or containers. The young plants are re-planted outdoors during the early part of summer. The plant is gathered during the late stages of flowering, commonly tied up in flattish bundles about 3 ft long and 1.5 to 2 lbs in weight and is sold in the market as dried brownish stems with root and leaves intact. (5)

#### Principal constituent:

Chirayata is reported to contain two bitter principles discovered by Höhn in 1869. These bodies are ophelic acid ( $\text{C}_{13}\text{H}_{20}\text{O}_{10}$ ), and chiratin ( $\text{C}_{26}\text{H}_{48}\text{O}_{15}$ ), the former being in largest amount is a hygroscopic, non-crystalline, yellow, viscid body, having an odour faintly suggestive of gentian, an acidulous, and its bitter taste is persistent. Water, ether, and alcohol dissolve it. It also contains

bitter glycosides— Gentiopicrosin, Amarogentin, Swerthrin. (1)

Xanthone derivatives— Chiritol, Swertianin, Mangiferin.

Alkaloids — Gentianine, Gentiocrucine

The ash of chirayata yields carbonates and phosphates of calcium, potassium, and magnesium. Tannin is almost entirely absent. The structure of Gentiopicrosin is shown in fig. 1-

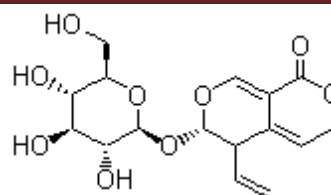


Fig 1: Structure

of Gentiopicrosin

#### Properties and actions mentioned in Ayurveda

*Rasa* : Tikta (bitter)

*Guna* : laghu (light), ruksha (dry)

*Virya* : Ushna (hot)

*Vipaka* : Katu (pungent)

*Dosha* : Balances Tridosha

#### Classical categorization

*Charaka-*

*Stanyasodhana* – group of herbs used in cleansing breast milk

*Trushnanigrahana* – group of herbs useful in relieving thirst

*TiktaSkandha* – Bitter tasting group of herbs

*Susruta- Aragvadhadi*

*Vagbhata- Aragvadhadi*

#### Parts used

The entire plant is used in traditional medicine; however the root is mentioned to be the most powerful part.

#### The concerns

The widespread use of *S. chirayata* in traditional medicine reflects its pharmacological importance. However, existing populations of *S. chirayata* are diminishing. Hence according to the new International Union for Conservation of Nature and Natural resources (IUCN) criteria, *S. chirayata* has been categorized as critically endangered (6,7). This leads to a need for conservation of the plant. *S. chirayata* has been prioritized by the National Medicinal Plant Board (Government of India) for conservation and cultivation in Uttanchal, emphasizing the need to develop agro-technology packages.

## Pharmacological activity:

The bitterness, antihelminthic, hypoglycemic and antipyretic properties are attributed to amarogentin (most bitter compound isolated till date), swerchirin, swertiamarin and other active principles of the herb. Herbal medicines such as Ayush-64, Diabecon, Mensturyl syrup and Melicon V ointment (2–3) contain chirayata extract in different amounts for its antipyretic, hypoglycemic, antifungal and antibacterial properties.

The ethanolic extract of *S. chirayata* exhibits hypoglycaemic activity. The herb is an excellent drug for strengthening the stomach. It is used in the treatment of dyspepsia and diarrhoea. Chirayata possesses *krimighna* (worms destroying) properties and is used in killing intestinal worms. An infusion of the herb is taken during parasitic infestations. It is generally taken in doses of 15 to 30 ml twice daily before meals. The root of the plant is useful in checking hiccups and vomiting. It is taken in doses of 0.5 to 2 grams with honey. The herb as well as its extracts is used as a bitter stimulant to treat fever as well as curing several skin problems. It is much employed in urinary complaints with uneasiness in the region of the kidneys, frequent urging to urinate, which is accomplished with difficulty, and in cases of uric acid deposits.

### Biological activities attributed to *S. chirayata*

Antihelminthic (9)

Anticholinergic (11)

Anticonvulsant (12)

Antimalarial, Antipyretic (14)

Antitubercular (15)

Astringent (16)

Bitter (17)

### Hypoglycemic/antidiabetic :- (18-24)

Here is a brief discussion regarding the use of this herb to treat these precise health problems. Laboratory tests with animals having excessive baseline blood sugar levels have demonstrated diminished blood sugar levels following healing with chirayata. On the contrary, animals do not demonstrate such decrease in the blood sugar levels provided they already have low levels to begin with. This difference in results in treatment with chirayata provides an indication that the herb may perhaps be beneficial in regulating blood sugar levels without the perils of developing hypoglycemia owing to any excessive dosage of the herbal medication.

Mangiferin, present in the stem of the plant is reported to possess considerable hypoglycaemic property and also shows suppressive effects on blood lipid profiles in diabetes. (27)

Mangiferin has several modes of action viz

i) May be due to reduced intestinal absorption of glucose (25).

ii) Enhances glycolytic enzymes which stimulates glycogenesis in the liver and thereby contributes to reduction of blood glucose (26).

iii) Direct stimulation of  $\beta$  cells to release insulin (27)

iv) Inhibiting  $\alpha$ -glucosidase & other enzymes as maltase, sucrase, isomaltase.

v) Enhances peripheral utilization of glucose

### Hepatoprotective Action of *Swertia Chirayata*

Due to effect of hepatotoxicant (like ethanol, drugs, chemicals and others) serum aspartate aminotransferase (ASAT), alanine aminotransferase (ALAT), and alkaline phosphatase (ALP) activities and bilirubin level are increased, but liver glycogen and serum cholesterol levels are decreased. Histologically it produced hepatocytic necrosis espe-

cially in the centrilobular region. As per recent study treatments with Swertiachirayata caused improvement at both biochemical and histopathological parameters(8). Chirayata contains amarogentin a glycoside that perhaps fortifies the liver against toxicity caused by carbon tetrachloride.

#### Other Medicinal uses of Swertiachirayata

- Antileishmaniasis (10) :The herb Swertiachirayata is an effective medication for leishmaniasis - a parasitic disease usually found in tropical regions.
- Drug also possesses digestive, hepatic (conditions pertaining to the liver) tonic, astringent and appetizer properties and used in cough, dropsy and skin diseases
- The astringent flavor of chirayata sets off an impulsive response that promotes the production of saliva and gastric enzymes. This reflex reaction owing to the use of the herb not only stops nausea, but also helps to cure indigestion, bloating and hiccups. In addition, chirayata also encourages the secretion of bile that promotes digestion as well as improves appetite.
- The plant also encloses xanthones that are supposedly effectual against malaria and tuberculosis.

#### Adverse Reactions/Drug Interactions

In case of Swertiachirayata, till now experimentally there is no adverse effect, drug interaction, or toxicity has been observed.

#### Cautions

Chirayata should be avoided by people with gastric or duodenal ulcers. This herb is considered safe when taken as prescribed. Do not medicate yourself with this herb, only use it under the supervision of a qualified practitioner.

## DISCUSSION AND CONCLUSIONS

Swertia Chirayata is a well-known plant used in ISM; in addition, folk medicine also claims uses especially in hepatic diseases, Diabetes, malarial fever and skin disorders etc. Recently chirayata has become widely cultivated in India, Sri Lanka, China, for its culinary and medicinal uses. It is also very important in a number of diseases for which there are considerable scientific reports and data. Chemically, swertiachirayata contains various biologically active phytoconstituents including chiratin, amarogentin, gentiopicrin, yellow crystalline phenols. It may thus be considered an important gift from Ayurveda to mankind.

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