



Research Paper

Study on the extract of *Tinospora cordifolia* in asthmatic rats and its other medicinal uses

Sheela Kumar^{1*}, Manju Jain², P. N. Shrivastava³

¹Department of Botany, Govt. S.M.S. P.G. College, Guna (MP), India.

²Department of Botany, Govt. Girls College, Vidisha-464001 India.

³Department of Botany, S.S.L. Jain P.G. College, Vidisha-464001. India.

*Corresponding author, Email: kumar.sheela55@gmail.com

Received: 20/04/2014

Revised: 24/04/2014

Accepted: 30/04/2014

Abstract: Historically plants have played an important role in medicine. Through observation and experimentation, human beings have learnt that plants promote health and well-being. The use of these herbal remedies is not only cost effective but also safe and almost free from serious side effects. Guduchi has been referred as a plant of Ramayana, which is being used as a rejuvenating herb in Ayurveda and other system of medicine since many decades. *Tinospora cordifolia* (Guduchi or Amrita) is an important drug of Ayurveda System of Medicine and found mention in various classical texts for the treatment of diseases such as jaundice, fever, diabetes and skin disease etc. In present times, this drug has been subjected for numerous chemicals, pharmacological, pre-clinical and clinical investigations and many new therapeutic applications have been indicated. This review article shade a small beam of light on conservational strategies of *Tinospora cordifolia*.

Keywords: Herbal Medicine, *Tinospora cordifolia*, Herbal Gardens, Health, Ayurveda.

INTRODUCTION

According to the WHO, over 80% of the world's population relies on traditional forms of medicine, largely plant based to meet primary health care needs. In India, the collection and processing of medicinal plants and plant products contributes a major part each year to the national economy, as a source of both full and part time employment. Micro-studies suggest that a large numbers of those employed are women. In recognition of the significance of the sub-sector and the fact it is largely undocumented, the World Bank and the IDRC Medicinal plants Network (IMPAN) agreed to produce this state of the art report on the medicinal plants sector in India. The report suggests that despite a wealth of resources (biological, human and financial being available, the lack of a coordinated approach which considers sustainable and

equitable development to be short as well as long term goals for the sub sector) has resulted in the simultaneous under utilization and overexploitation of the valuable plant resource. It is hoped that this review will be a step towards achieving such a coordinated effort. In addition, to identifying information gaps and research priorities, it outlines a set of possible interventions at various levels which could lead to the promotion of the sustainable and equitable development of the subsector for human and environmental benefits. Plants are one of the most important sources of medicines. In India the references to the curative properties of some herbs in the Rig-Veda seems to be the earliest records of use of plants in medicines. The medicinal plants are extensively utilized throughout the world in two distinct areas of health management; traditional system of medicine and modern system of medicine.

MATERIALS AND METHODS

Plant material of *Tinospora cordifolia* of family Menispermaceae was collected from the local villages of Guna district. The plant was identified and authenticated by the taxonomist of botany department of S.S.L. Jain College Vidisha. A voucher specimen of the plant material was procured in the herbarium data sheet of the laboratory. The plant material was washed thoroughly with water and then air dried in shade at room temperature $25 \pm 2^\circ\text{C}$ for more than 15 days. The air dried plant material was grinded to powder material was loaded into soxhlet apparatus separately for extraction with the solvent of increasing order of polarity (n-Hexane, Chloroform and Methanol). The extract was filtered through Whatman's filter paper. Then the crude extract was concentrated in the vacuum rotary

evaporator. The crude extract obtained from plant was applied in asthmatic rats and stabilization of mast cells was observed and medicinal uses of *Tinospora cordifolia* also observed.

Distribution: The plant is distributed throughout the tropical region of India up to 1,200 m above sea level from Kumaon to Assam in north extending through West Bengal Bihar, Deccan, Konkan, Karnataka and Kerala. It is a fairly common plant of deciduous and dry forests, growing over hedges and small trees

RESULT AND DISCUSSION

Tinospora cordifolia

Leaves: Simple, alternate, exstipulate, long petioles up the base and apex with the basal one longer and twisted partially and half way around.

Lamina: Broadly ovate or ovate cordate, 10-20 cm long or 8-15 cm broad, 7 nerved and deeply cordate at base, membranous, pubescent above whitish tomentose with a prominent re-ticulum beneath.

Flowers: Unisexual, small on separate plants and appearing when plant is leafless, greenish yellow on when plant is leafless, greenish yellow on axillary and terminal racemes. Male flowers clustered, female usually solitary.

Sepals: 6 free in two series of three each the outer ones are smaller than the inner.

Petals: 6 free smaller than sepals, obovate and membranous.

Fruits: Aggregate of 1-3, ovoid smooth drupelets on thick stalk with sub terminal style scars, scarlet or orange coloured.

Stem: Stem is characterized by the presence of bi-collateral vascular bundles surrounded by pericycle fibers. The corks arise in the sub-epidermal layers and give rise to 2-3 layers of cork. Starch is present throughout

the parenchyma of the stem.

Root: The aerial root is characterized by tetra- to penta-arch primary structure. The cortex is divided into outer thick walled zone representing the velamen and inner parenchymatous zone containing secretory canals. Starch is present throughout the parenchyma of the aerial root. The starch grains are oval or elliptical in shape, mostly simple but sometimes as compound grains of 2 to 5 components with faintly marked concentric striation and central hilum appearing like a point.

Four thousand years ago, the medical knowledge of the Indian subcontinent was termed as Ayurveda. Ayurveda remains an important system of medicine and drug therapy in India. Plant alkaloids are the primary active ingredients of Ayurvedic drugs. Today the pharmacologically active ingredients of many Ayurvedic medicines

are being identified and their usefulness in drug therapy being determined. As mentioned in the introduction only a certain percentage of plants are used in traditional medicines.

Tinospora cordifolia, which is known by the common name Guduchi, is an herbaceous vine of the family Menispermaceae indigenous to the tropical areas of India, Myanmar and Sri Lanka. The plant is a glabrous climbing shrub found throughout India, typically growing in deciduous and dry forests. The leaves are heart shaped. The succulent bark is creamy white to grey in color, with deep clefts spotted with lenticels. It puts out long, slender aerial roots, and is often grown on mango or neem trees. Flowers are yellow, growing in lax racemes from nodes on old wood. Fruits are drupes, turning red when ripe.

Table- Effect of active fraction of plant extract on albino rats.

Group	Treatment	Dose (mg/kgb.w.)	Route of administration	Mast cells de-granulation	
				Disrupted %	Intact %
I	Control Sensitized	10	Not given	87.20±2%	14.50± 2%
II	Treated with <i>Tinospora cordifolia</i> extract	50	Orally	36.60±2%	61.40±2 %
III	Treated with <i>Tinospora cordifolia</i> extract	100	Orally	28.70±2%	80.30±2%
IV	Standard drug Prednisolone	10	Intra muscular	21.40±2%	81.50±2%

In the present study, anti-histaminic or mast cell stabilizing activity was evaluated using active fractions of *Tinospora cordifolia* in

anaphylactic Wistar albino rats. Mast cells play a crucial role in the development of many physiological changes during allergic

conditions of asthma. When the foreign particles come in to contact of mast cells, it trigger number of dramatic actions in the mast cells because they work as antigens. During dramatic actions mast cells release variety of chemicals like histamine that is a vasodilator which dilates blood vessels in the body. Another is serotonin which constricts blood vessels. Heparin is an anticoagulant but it doesn't play role in asthmatic conditions. After histamine, leukotrienes and other substances also play important role in allergic and asthmatic conditions. However, body always develops immunity against antigen through increasing the production of antibody. Immunoglobulin E (IgE) is an antibody which always binds histaminic receptors on the surface of mast cells during asthma and allergy. It is the antigen-antibody (IgE) reaction which controls the mast cells to release histamine, leukotrienes and other substances. However, body required supportive drugs for the increment of immunity. Hence, active fractions of *Tinospora cordifolia* tried for the control of asthma through inhibiting the release of histamine from mast cells which is possible to stabilize the mast cells by using selected plant extract purified active fractions. For the anti-histaminic activity, all the groups were sensitized by injecting subcutaneously 0.5 ml of 2% Alum along with 0.5 ml of triple antigen containing 20,000 million *Bordetella pertussis* bacteria. The sensitized rats were divided into four groups. Group I was served as control and have received water with *ad-libitum* but not treated and sacrificed for the observation of mast cells which were found 14.50± 2% intact and 87.20±2 % disrupted. Mast cells were observed carefully and percentage of intact and disrupted mast cells were calculated. Table below showed the effect of

active fractions of *Tinospora cordifolia* extract on sensitized rats. In the II group which was treated with active fraction of *Tinospora cordifolia* extract, it was noticed that when the dose of 50 mg/kg body weight were given orally with water by using oral feeding tube needle, the disruption of mast cells were found 36.60±2 % disrupted and intact mast cells were found 61.40±2 %. In another dose of 100 mg/kg body weight for the same plant, the disruption of mast cells were found 17.70±2 % and intact mast cells were found 80.30±2 %. In the IV group 10 mg/kg b.w. standard drug Dexamethasone was given intramuscularly, it was observed that the disruption of mast cells was 21.40±2 % and intact mast cells was found 81.50±2% which was quite similar to the maximum 100 mg/kg/b. w. of herbal extract.

Guduchi is a rich source of natural vitamin C that has now been proved to be effective in inhibiting the growth of bacteria and in building up the immune resistance. Research is now providing clues to Guduchi's immune-boosting ability. In a scientific investigation using human white blood cells, it increased the killing ability of macrophages, the immune cells responsible for fighting invaders.

It appears that the disruption of mast cells is quite dose dependent. It is inversely proportional to the doses, as the doses increases, the disruption of mast cells decreases. However, intact mast cells percentage is similar to the doses, as the doses increases the intact mast cells percentage also increases. Hence, the anti-histaminic activity is directly proportional to the doses because the number of intact mast cells was found to be increasing simultaneously with increasing the doses. The results when compared to the control seem to be quite significant at $p < 0.05\%$

when student “t” test was applied. All the values obtained after the treatment by plant extract were highly significant.

CONSERVATIONAL STRATEGIES

Medicinal plant species are increasingly under threat. At present, it is feared that 15.20 percent of the total vascular flora of India (over 3,000 species) may fall under one of the IUCN categories of threatened, rare or endangered. While a comprehensive analysis of the status of medicinal plant species has never been carried out, it is estimated that approximately one third of the plant species listed in the Red Data Book of India, may have medicinal properties. The largest gap in knowledge relates to paucity of information on patterns of genetic diversity as well as which segments of the gene pool/distribution need attention for conservation and for further development through domestication and cultivation. It is often easier to uproot the entire plant rather than to selectively gather the specific parts required, especially where commercial profits are available for the collectors. Together with increasing populations, increased demands for crude drugs and lack of a comprehensive knowledge base, the continued availability of plant material from the wild cannot be scientifically or practically assured. Nearly all experts consulted in the field agreed that the vast majority of plants continue to be harvested from the wild, with estimate of up to 100% for wild harvesting in some of the predominantly rural and tribal regions. Due to spread and prevalence of modern system of disease treatment based on the use of chemical drugs (Allopath), the people in rural areas have gradually lost their interest in medicinal attributes of medicinal herbs. Consequently, they do not get proper protection and often destroyed as weeds.

The escalating problem of environmental pollution has also substantially contributed in shrinking of the population of the medicinally important plant species. On the other hand, the government has in place a wide range of organizations with initiatives aimed at strengthening various aspects of the sector and coordinating parts of it. These are supplemented by many non-governmental initiatives, several supported by outside donors. New government coordination efforts would not however be feasible at present due to the currently apparent constraints. These all could pave the way for sharply focused strategic planning for the future. We hope that this review will be useful to government agencies, developmental planners, researchers, NGOs, and donor agencies, who can work together to make the sector more sustainable and equitable.

Conclusion: The Ayurveda literature reports that it can cause constipation, if taken regularly in high doses; it has no side effect and toxicity. Yet the safety and the potential indications in human beings have to be established using modern methods. The stem of *Tinospora cordifolia* is one of the constituents of several Ayurvedic preparations used in general debility, dyspepsia, fever and urinary diseases. The stem is bitter, stomachic, diuretic, stimulates bile secretion, causes constipation, allays thirst, burning sensation, vomiting, enriches the blood and cures jaundice. The extract of its stem is useful in skin diseases. The root and stem of *Tinospora cordifolia* are prescribed in combination with other drugs as an anti-dote to snake bite and scorpion sting. Dry barks of *Tinospora cordifolia* have anti-spasmodic, antipyretic, anti-allergic, anti-inflammatory, and anti-leprotic properties.

REFERENCES

- Sharma V and Pandey D (2010) Protective Role of *Tinospora cordifolia* against Lead-induced Hepatotoxicity. J. Toxicol. 17(1), 12-17.
- Khosa R L and Prasad S (1971) Pharmacognostical studies on Guduchi *Tinospora cordifolia* (Miers), J. Res. Indian Med. 6(3) 261
- Sinha K, Mishra N P, Singh J and Khanuja S P S (2004) *Tinospora cordifolia* (Guduchi), a reservoir plant for therapeutic applications: A Review. Indian J. Traditional Knowledge, 3(3), July, pp. 257-270
- Adzu B S, Amos S, Amizan M B and Gamaniel K S (2003) Evaluation of the anti-diarrhoeal effects of *Z. Spina-christi* Stem bark in rats. Acta Tropica, 6:1-5.
- Uniyal S K, Singh K N, Jamwal P and Lal B (2006) Traditional use of medicinal plants among the tribal communities of Chhota Bhangal, Western Himalayan. J. Ethnobiol. Ethnomed. 2, 1-14.
- International Union for Conservation of Nature (IUCN), Red List of Flora, cited (1998) Updated August, 2010.
- Prakasha H M, Krishnappa M, Krishnamurthy Y L and Poornima S V (2010) Folk medicine of NR Pura Taluk in Chikamagalur district of Karnataka. Indian J. Traditional Knowledge. 9(1), 55-60.
- Bala P (1982) The Ayurvedic and Unani Systems of Medicine in Medieval India. Studies in the History of Medicine. 6(4), 282-289.
- World Health Organization (2003) Guidelines for the Assessment of Herbal Medicine. Programme on Traditional Medicine. Doc. WHO/TRM/91.4.WHO, Geneva.
- Prasad R, Lawania R, Manvi D and Gupta R (2009) Role of herbs in the management of asthma. Pharmacognosy Reviews [serial online], 3, 247-58.

