



Study on the qualitative phytochemical analysis of *Tinospora cordifolia* satva

B. H. Shiny Vinila¹, N Vishali², Ashalata Gannepalli³, Sai Manohar Valsa⁴, V Sureka⁵

¹PhD Research Scholar, Department of Anatomy, Meenakshi Academy of Higher Education and Research, Chennai, Tamil Nadu, India.

²Associate Professor, Department of Anatomy, Vels Medical College & Hospital, Manjankaranai, Tiruvallur, Tamil Nadu, India.

³Professor, department of Oral and maxillofacial pathology, Panineeya Mahavidyalaya Institute of Dental Sciences,

⁴PhD Research Scholar, Department of Pharmacology, Meenakshi academy of Higher Education and Research, Chennai, Tamil Nadu.

⁵Dean Research, Meenakshi Academy of Higher Education and Research, Chennai, Tamil Nadu, India.

Corresponding author: Sai Manohar Valsa,
saimanohar82@gmail.com

Abstract

Background: *Tinospora cordifolia* is a popular plant that is used in Ayurveda, traditional and tribal herbal medicine. The *Tinospora cordifolia* satva is extracted from the stem of the *Tinospora cordifolia* and used for the treatment of many diseases. In the recent days the plant is widely used and the knowledge about the phytochemical properties is limited. The present study was undertaken to understand the the phytochemical properties of the *Tinospora cordifolia* satva.

Materials and the methods: *Tinospora cordifolia* satva was procured from the standard ayurvedic medical store. 10mg of the satva was used to prepare methanolic extract and the qualitative phytochemical analysis was performed for the alkaloids, flavonoids, phenols, steroids, tannins, terpanoids, saponins, glycosides, carbohydrates and the proteins.

Results: The qualitative phytochemical analysis showed that the presence of alkaloids, flavonoid, phenols, glycosides, steroids, and tannins.

Conclusion: The results of the present study shows that, the presence of the good phytocomponents such as alkaloids, flavonoids, phenols and taninns which have good medicinal properties.

Keywords: Guduchi, Giloy, antiinflammatory, flavonoids, alkaloids

DOI: 10.48047/ecb/2023.12.Si9.259

Introduction:

Tinospora cordifolia is widely used in ayurveda which is a system of Indian medicine. It has many names and most commonly used names are Guduchi or Amrutha or Giloy. The ayurvedic properties or dravya guna of *Tinospora cordifolia* are Rasa- Tikta, kasaya (Bitter, Astringent); Guna- Laghu, guru, Snigdha (Light, Heavy, Unctuous); Virya - Ushna (Hot potency); Vipaka - Madhura (neutral).¹ It has many

therapeutic benefits and used in the treatment of inflammation, allergy, diabetes, anemia, urinary problems, skin diseases, jaundice, rheumatism.² *Tinospora cordifolia* has immunomodulator activity, antibacterial, anti-diabetic activity, anti-helminthic activity, anti-stress, hypolipidemic, anti HIV activity, and wound healing.³ The efficient pharmacological activities of the plant is mainly because of its chemical constituents such as alkaloids, flavonoids, phenolics, diterpenoid lactones, glycosides, steroids, tannins, aliphatic compounds, sesquiterpenoid, essential oils, a mixture of fatty acids, and carbohydrates and is present in a various part of the plant body like stem, root, leaves, seeds and whole part.⁴

Tinospora cordifolia satva commonly known as 'Guduchi satva' is an aqueous extract of starch substance from its stem which is highly nutritive, digestive and used in the treatment of many diseases.⁵ This drug has been subjected to extensive phytochemical and pharmacological screening for its components from past 2 decades along with preclinical trials and clinical investigation.^{6,7} Literature shows that the phytochemical screening and quantification for crude stem of *Tinospora cordifolia* and very limited literature is available for the *Tinospora cordifolia satva* which is commonly used in ayurvedic practice.⁸ Thus the present study was aimed to quantify the phytochemical constituents in the *Tinospora cordifolia satva*.

Materials and methods:

Tinospora cordifolia stem aqueous extract called satva was procured from the standard certified ayurvedic medical pharmacy (Guduchi Amrutha satvam; S S Ayurveda Industries; Andhra Pradesh). The *Tinospora cordifolia satva* was subjected to Soxhlet extraction method. Around 10g of powdered sample was filled into a thimble and subjected to Soxhlet extraction using 150ml methanol as solvent. The extract was concentrated using rotary evaporator and used for further analysis.

Qualitative analysis for *Tinospora cordifolia satva*: In the present study qualitative analysis was done for alkaloids, flavonoids, carbohydrates, proteins, steroids, glycosides and tannins,

Test for Alkaloids detection:

Wagner's test: It is also called as iodine test for alkaloids as the reagent was prepared by dissolving 2 gm of iodine and 6 gm of potassium iodide in 100 ml of distilled water. Few drops of the reagent were added to *Tinospora cordifolia satva* extract in a test tube.

Presence of reddish-brown precipitate indicates the presence of alkaloids.

Hager's test: 2ml of the *Tinospora cordifolia satva* extract was taken into the test tube and 2 ml of the Hager's reagent (Saturated picric acid solution) and mixed it and the observations were noted. Yellow precipitation indicates the presence of the alkaloids.

Test for Flavonoid detection:

Alkaline reagent test: *Tinospora cordifolia* extract was taken into a test tube and 2ml of 2% NaOH solution was added that produced yellow colour solution. 2 drops of diluted acid was added and the observations were noted. The yellow colour solution changes to colourless solution indicate the presence of the flavonoids.

Test for phenols and Tannins detection:

Ferric chloride test: 1ml of the *Tinospora cordifolia satva* extract was taken into a test tube and 2 ml of the 5% ferric chloride solution was added to it. The observations were noted. The dark blue colour indicates the presence of phenolic compounds and tannins.

Test for Carbohydrates detection:

Fehling's Test: Fehling A and Fehling B reagents were taken into a test tube and mixed well. A few drops of the *Tinospora cordifolia satva* extract was added and boiled. The observations were noted. A brick red coloured precipitate of cuprous oxide formation indicates presence of the carbohydrates.

Iodine test: 2ml of the iodine solution with potassium iodine was added to 2ml of the *Tinospora cordifolia satva* extract and the observations were noted. The appearance of the blue colour indicates presence of the starch

Test for Proteins detection:

Ninhydrin's test: 1ml of *Tinospora cordifolia* extract was taken into a test tube and 2 drops of 0.2% freshly prepared ninhydrin solution was added. A deep blue colour obtained in the solution indicates presence of proteins.

Test for Steroids detection:

Salkowski test: 1 ml of *Tinospora cordifolia satva* extract was taken into a test tube and 2ml of chloroform and 2 ml of concentrated Sulfuric acid (H_2SO_4) was added. The test tube was shaken well. The observations were noted.

If the steroids were present the chloroform layer appears red and acid layer greenish yellow fluorescent.

Test for glycosides detection:

Salkowski's test: For the analysis of glycoside, 1 ml of *Tinospora cordifolia satva* extract was taken into a test tube and 2ml of chloroform was added. Then 2ml of concentrated Sulfuric acid was added and shaken gently. A reddish brown colour indicates the presence of glycoside.

Test for terpanoids detection:

Salkowski test: 5ml of the *Tinospora cordifolia satva* extract was taken into a test tube and 2ml of the chloroform was added to form a layer and the observations were noted. A reddish brown coloration of the interface indicates presence of the terpenoids.

Test for saponins detection:

Foam Test: *Tinospora cordifolia* extract was diluted with 20 ml of distilled water and it was shaken in a graduated cylinder for 15 min. A layer of foam was formed which indicated the presence of Saponin.

Results:

The phytochemical quantitative analysis of *Tinospora cordifolia satva* extract shows the presence of the flavonoids, alkaloids, phenols, steroids, glycosides and the tannins. The carbohydrates, proteins, terpenoids and saponins were observed to be absent (Table 1).

Table 1: Qualitative analysis of *Tinospora cordifolia satva*

Sl. No	Phytochemical	Results
1	Alkaloid	
	Wagner's test	Present
	Hager's test	Absent
2	Flavonoid	
	Alkaline reagent test	Present
3	Phenol	
	5% FeCl ₃ test	Present
4	Carbohydrates	
	Felings test	Absent
	Iodine test	Absent
5	Proteins	
	Ninhydrin's test	Absent
6	Steroids	
	Salkowski test	Present
7	Glycosides	
	Salkowski test	Present
8	Tannin	
	Salkowski test	Present
9	Terpenoids	
	Salkowski test	Absent
10	Saponin	
	Froth test	Absent

Discussion:

Tinospora cordifolia is a creeping shrub belongs to the family Menispermaceae. It is most commonly found in south Asian countries and it is indigenous to the tropical areas of India, Sri Lanka and Myanmar.¹⁰ *Tinospora cordifolia* is not only used in ayurveda but also used in tribal and folk medicine.¹¹ All the parts of the plant contains beneficial phytochemicals that was reported by ethnobotanists.¹² *Tinospora cordifolia* has remarkable medicinal properties such as anti-inflammatory, antioxidant, antiallergic, antispasmodic, antidiabetic, anti-arthritic, antistress, anti-leprotic, anti-malarial, antipyretic, anticancer, immunomodulatory and hepatoprotective activities.¹³ The literature suggests that the active phytochemicals like alkaloids, flavonoids, glycosides, steroids, terpenoids, tannins, proteins, carbohydrates, saponins in the different parts of the plants that includes roots, leaves, stem and whole plant.^{3, 10, 14, 15}

Tinospora cordifolia satva is an aqueous extract of the stem of it and commonly known as Guduchi satva in ayurvedic system of medicine and commonly prescribed for various diseases in Ayurveda.^{16, 17} The qualitative phytochemical analysis was carried out for various parts of the *Tinospora cordifolia* plant such as leaves, stem but, the

studies on the stava are not reported much. Thus the present study was undertaken to find the qualitative phytochemical analysis of the *Tinospora cordifolia* satva extract.

Iqra Nazir & Rikhi Chanhan reported the presence of alkaloids, glycosides, phenols, tannins, flavonoids, and carbohydrates in the leaves of the *Tinospora cordifolia*.¹⁰ Pradhan D et al., studied on the crude stem of the *Tinospora cordifolia* and reported a variation in the phytochemicals of the *Tinospora cordifolia* stem based on the size of diameter of the stem and reported that the phyto-components were increased as the size of the stem increased. They reported the presence of alkaloids, flavonoids, phenols, saponins, glycosides, steroids, carbohydrates and proteins in the crude stem.¹⁴ Rohith Sharma et al., studied on the qualitative analysis of *Tinospora cordifolia* satva and found that only alkaloids, starch and carbohydrates present in it, whereas in the present study the qualitative phytochemical analysis showed that the presence of alkaloids, flavonoids, phenols, steroids, glycosides, and tannins in the *Tinospora cordifolia* stava.¹⁸ The carbohydrates, proteins, saponins and terpenoids were found to be absent. There may be seasonal and demographic area of the plant may also have an impact on the phytochemical properties.

Conclusion:

The presence of the phytochemical compounds alkaloids, flavonoids, steroids, tannins and glycosides in *Tinospora cordifolia* satva shows that it has good medicinal properties and can be used in the treatment of various conditions such as inflammation, infections, etc. Further studies on the quantitative analysis and the seasonal or demographic variations in the satva can be conducted.

References:

1. Upadhyay AK, Kumar K, Kumar A, Mishra HS. *Tinospora cordifolia* (Willd.) Hook. f. and Thoms. (Guduchi) - validation of the Ayurvedic pharmacology through experimental and clinical studies. *Int J Ayurveda Res.* 2010 Apr;1(2):112-21. doi: 10.4103/0974-7788.64405. PMID: 20814526; PMCID: PMC2924974.
2. Sharma U, Bala M, Kumar N, Singh B, Munshi RK, Bhalerao S. Immunomodulatory active compounds from *Tinospora cordifolia*. *Journal of Ethnopharmacol.* 2012 Jun 14;141(3):918-26. doi: 10.1016/j.jep.2012.03.027. Epub 2012 Mar 26. PMID: 22472109.
3. Sharma P, Dwivedee BP, Bisht D, Dash AK, Kumar D. The chemical constituents and diverse pharmacological importance of *Tinospora cordifolia*. *Heliyon.* 2019 Sep 12;5(9):e02437. doi: 10.1016/j.heliyon.2019.e02437.
4. Khan, Md & Haque, M & Chowdhury, Md. Medicinal use of the unique plant *Tinospora Cordifolia*: Evidence from the traditional medicine and recent research. *Asian Journal of Medical and Biological Research.* 2017; 2: 508. 10.3329/ajmbr.v2i4.30989.
5. Garg P, Garg R, Qualitative and quantitative analysis of leaves and stem of *Tinospora cordifolia* in different solvent extract, *Journal of Drug Delivery and Therapeutics.* 2018; 8(5-s):259-264. <http://dx.doi.org/10.22270/jddt.v8i5-s.1967>
6. Sivakumar V, Dhanarajan M.S, Riyazullah M.S. Preliminary phytochemical screening and evaluation of free radical scavenging activity of *Tinospora*

- cordifolia. International Journal of Pharmacy and Pharmaceutical Sciences 2011, 2:186-88.
7. Sensen Chi, Gaimei She, Dan Han, Weihua Wang, Zhao Liu, and Bin Liu. Genus *Tinospora*: Ethnopharmacology, Phytochemistry, and Pharmacology. Evidence-Based Complementary and Alternative Medicine Volume 2016, Article ID 9232593, 32 pages <http://dx.doi.org/10.1155/2016/9232593>
 8. Pankaj B. Satpute, Dattaprasad N. Vikhe. Pharmacognosy and Phytochemistry of *Tinospora cordifolia*. Research Journal of Pharmacognosy and Phytochemistry. 2022; 14(3):195-3. doi: 10.52711/0975-4385.2022.00035
 9. Garg Praveen, Garg Rajesh. Qualitative and quantitative analysis of leaves and stem of *Tinospora cordifolia* in different solvent extract. Journal of Drug Delivery & Therapeutics. 2018; 8(5-s):259-264.
 10. Iqra Nazir and Rikhi S Chauhan. Qualitative phytochemical analysis of *Tinospora cordifolia* and *Withania somnifera*. The Pharma Innovation Journal 2018; 7(10): 333-336.
 11. Singh SS, Pandey SC, Srivastava S, Gupta VS and Patro B: Chemistry and medicinal properties of *Tinospora cordifolia* (Guduchi). Indian Journal of Pharmacology 2003; 35:83-91.
 12. Jain SK. Dictionary of Folk Medicine and Ethnobotany. Deep Publishers, New Delhi, 1991: 179-80.
 13. Khosa RL and Prasad S: Pharmacognostical studies on Guduchi *Tinospora cordifolia* (Miers.). J Res Ind Med 1971; 6:261-9.
 14. Pradhan D, Ojha V and Pandey AK: Phytochemical analysis of *Tinospora cordifolia* (willd.) Miers ex Hook. F. & Thoms stem of varied thickness. Int J Pharm Sci Res 2013; 4(8); 3051-3056. doi: 10.13040/IJPSR. 0975-8232.4(8).3051-56.
 15. Singh D., Chaudhuri P.K. Chemistry and pharmacology of *Tinospora cordifolia*. Nat. Prod. Commun. 2017;12:299–308.
 16. Anonymous. 2nd ed. Part 1. New Delhi: Ministry of Health and Family Welfare, Govt of India; 2003. The Ayurvedic Formulary of India; 560.
 17. Namjoshi AN. Gomantak Press; 1960. Studies in the Pharmacognosy of Ayurvedic Drugs; 6.
 18. Rohit Sharma, Hetal Amin, Prajapati PK. Physicochemical evaluation of male and female plants of Guduchi (*Tinospora cordifolia* (Willd.) Miers).The Journal of Phytopharmacology 2015; 4(2): 116-120 .