



## Research Article

### A COMPARITIVE EVALUATION OF SPECIES OF *GUDUCHI* (*TINOSPORA CORDIFOLIA* (WILID.) MEIRS EX HOOK. F & THOMS., *TINOSPORA MALABARICA* MEIRS EX HOOK, *TINOSPORA CRISPA* MEIRS.) W.R.T SATWA

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#### KEYWORDS: *Guduchi*

(*Tinospora cordifolia* (wilid.) Meirs ex hook. f & thoms., *Tinospora malabarica* meirs ex hook, *Tinospora crispa* meirs.) *Satwa*, Phytoconstituents, Organoleptic characters.

#### ABSTRACT

**Background:** *Guduchi* is a plant belonging to Menispermaceae family and widely used in Ayurvedic system of medicine. *Tinospora cordifolia* is the accepted botanical source of *Guduchi*. All the three species are indigenous to the tropical areas of India, Sri Lanka and Myanmar. *Guduchi Satwa* is the most commonly used dosage form of the plant for various conditions like fever, arthritis, gastric ulcer cough etc. *Tinospora cordifolia* (*Guduchi*) is a widely used shrub in folk and Ayurvedic systems of medicine. Species of the plant, stem size, collection time, season and maturity of the plant may affect the yield and physico-chemical profile of *Guduchi Satwa*. Due to high demand and less yield of *Satwa* from *Guduchi* plant, market sample of *Guduchi Satwa* is subjected to adulteration. Hence this study is aimed at standardizing *Guduchi Satwa* prepared from all the three available species of the plant.

**Methodology:** The study deals with preparation of *Satwa* as per the classical text of Ayurveda, identifying organoleptic features, conducting physicochemical and photochemical screening of the *Satwa* of all the above mentioned species of *Guduchi* (*Tinospora cordifolia* (wilid.) Meirs ex hook. f & thoms., *Tinospora malabarica* meirs ex hook, *Tinospora crispa* meirs.)

**Results:** The study provided significant difference in the yield of *Satwa*. Variations in the organoleptic characters were insignificant. All the phytoconstituents were found to be same and the physicochemical values were within the limits in all three species.

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#### INTRODUCTION

India is a country with recorded and well-practiced herbal and traditional medicine. Among the vast library of important medicinal plants, *Guduchi* is immensely valuable in terms of therapeutics and global trade. In mythological understanding *Guduchi* is referred as heavenly elixir having saved celestial beings from old age and kept them eternally young.<sup>[1]</sup> *Bhavprakash*, well known and popular lexicon writer has dedicated a chapter on *Guduchi* called *Guduchyadi varga*. It is valued for its huge therapeutic potential since thousands of years and also in the modern scientific society it is appreciated for its immense therapeutic potential.

*Samhita kala* references begin with *Charaka Samhita*: There are several synonyms mentioned under *Guduchi* and it is included under seven different *Dashemani*. *Guduchi* is said to possess best *Sangrahika* and *Vibandhaprahamana* properties. While in *Sushruta Samhita* description of *Guduchi* is found available at 41 places and is included in 9 *Ganas* or groups, based on its diverse therapeutic uses. Apart from that it is also placed in smaller group like *Vallipanchamulla*. *Ashtanga samgraha*: *Guduchi* is mentioned alone or in combination with other remedial agents in the treatment of *Jwara*, *Prameha* etc.

*Nighantu kala* description begins as following:

**Dhanvantari Nighantu:** *Guduchi* was mentioned first in one out of seven Vargas. Two varieties- *Guduchi* and *Kanda Guduchi* are described.

**Kaiyadeva Nighantu:** *Guduchi* is mentioned in *Aushada varga*. Varieties are mentioned as *Guduchi* as *Guduchi* and *Pinda guduchi*.

**Bhavprakasha Nighantu:** *Guduchi* has been mentioned under *Guduchyadi varga* with its mythological origin with *Rasayana*, *Deepana*, and *Balya* properties.

**Raj Nighantu:** Description of two types of *Guduchi* and *Kanda Guduchi* with therapeutic utilities has been given.

**Shaligrama Nighantu:** *Guduchi* has been described in *Guduchyadi gana*.

**Adhunika Kala:** *Dravyaguna vijnana* describes The Latin name, vernacular names, synonyms, botanical description along with properties and action on different system are described with its therapeutic dose and formulation. In Indian medicinal plant: Its botanical description along with different species and medicinal uses are illustrated.

*Tinospora cordifolia* is the accepted botanical source for *Guduchi*. *Tinospora malabarica* and *Tinospora crispa* are used as substitutes and sometimes as adulterants also.<sup>[2]</sup> Distribution of the above three species varies across the country.<sup>[3]</sup> There are several *Kalpanas* (dosage forms) in Ayurvedic classics mentioned which are widely popular in the clinical practice, one among them is *Satwa*. It is considered as a derivative of *Hima kalpana*.<sup>[4]</sup> *Satwa* means the essence or active part. The *Satwa* of a plant drug is the essence and here it refers to starchy substance extracted using water as a solvent. In plants where in is having medicinal value from such plants it is special technique known as *Satwa kalpana*. As *Satwa* is tasteless, effective in minimal dosage which can be used as adjuvant has gained momentum in today's Ayurveda practice.<sup>[5,6]</sup> It is used in Ayurvedic treatment of burning sensation in feet, menorrhagia, nasal bleeding, bleeding per rectum, emaciation etc. It is known to boost immunity also.

## Pharmacognostic Evaluation of Plants [7,8]

### Macroscopic Evaluation

The macroscopic characters of the drug *Guduchi Satwa* were observed for colour, taste, texture and odour.

### Physicochemical Evaluation

Total ash value, acid insoluble ash, alcohol soluble extractive, water soluble extractive and loss on drying were determined.

### Phytochemical Evaluation

Alkaloids, Flavanoids, Saponnins, Glycosides, Triterpenoids, Tannins, Phenolic compounds, Proteions, Carbohydrate, Steroids and Starch tests were carried out.

## MATERIALS AND METHOD

**Botanical name:** *Tinospora cordifolia* (wilid.) meirs ex hook. f & thoms., *Tinospora malabarica* meirs ex hook, *Tinospora crispa* meirs.

**Family:** Menispermaceae

### Collection and Identification of the Plant Material

Three varieties of stems of *Guduchi* were procured from herbal garden of Sri Sri College of Ayurvedic Science and Research, Bengaluru-82. The genuinity of the plants (stem part) was confirmed by Botanist, Department of Dravyaguna, Sri Sri College of Ayurvedic Science and Research. The voucher specimen DGMPS002 was preserved in the Department of Dravyaguna.

### Preparation of Satwa<sup>[4,5]</sup>

The stems of thumb size mature *Guduchi* weighing 5kg was procured. Further the stems were well rinsed with water to remove dust and foreign particles adhered to drug removing the cover of *Guduchi* stem so as to avoid interference during preparation of *Satwa*. Stem of *Guduchi* was then cut into small pieces and was pounded in pestle and motor till fibres of stem get separated and the material becomes sticky. These fibres were placed in a vessel and 4 times water was added. It was then well macerated with hands and kept overnight for soaking. Next day the mixture was again macerated until the stickiness disappeared. Then fibres were removed and the remaining material was strained through clean cloth. The strained material was collected in a flat bottom stainless steel container and allowed for the sedimentation. After settling of the fine particles present in the mixture, the upper liquid portion was decanted carefully. After decantation the sediments obtained was again mixed with little quantity of water and allowed for sedimentation and liquid was removed by decantation process. By repeated washing and decantation, clear white *Satwa* was obtained. Sediment settled at the bottom was collected into a tray, air-dried and stored in sterile container. This procedure was repeated for all the three species of *Guduchi*.

**Thin Layer Chromatography**

Chromatographic condition for determination

Sample: 2gms of *Satwa* was dissolved in distilled water

Stationary phase: Silica gel 60F 254

Mobile phase: Methanol (9): chloroform (1)

Detection of wavelength: 366nm and 254nm

Rf values were calculated

Rf =  $\frac{\text{Distance travelled by the spot}}{\text{Distance travelled by the solvent front}}$ 

Distance travelled by the solvent front

**RESULTS AND DISCUSSION****Table 1: Showing *Satwa* obtained from three different species**

| Sl.no | Sample              | Quantity of drug | Quantity of <i>Satwa</i> |
|-------|---------------------|------------------|--------------------------|
| 1     | <i>T.cordifolia</i> | 5kgs             | 12gms                    |
| 2     | <i>T.malabarica</i> | 5kgs             | 45gms                    |
| 3     | <i>T.crispa</i>     | 5kgs             | 39gms                    |

**Table 2: Showing organoleptic features of *Guduchi Satwa***

| Sl.no | Characteristic feature         | <i>T. cordifolia</i> | <i>T. malabarica</i> | <i>T. crispa</i>   |
|-------|--------------------------------|----------------------|----------------------|--------------------|
| 1     | <i>Sparsha</i> (touch/texture) | Fine Smooth powder   | Fine Smooth powder   | Fine Smooth powder |
| 2     | <i>Roopa</i> (Shape)           | Coarse               | Amorphous            | Amorphous          |
| 3     | <i>Varna</i> (Colour)          | Ash grey             | White                | Milky White        |
| 4     | <i>Rasa</i> (Taste)            | Tasteless            | Tasteless            | Tasteless          |
| 5     | <i>Gandha</i> (odour)          | Odourless            | Odourless            | Odourless          |

**Physicochemical Study****Table 3: Showing physicochemical parameters of *Guduchi Satwa***

| S.No | Name of the Test           | Result               |                     |                 | Standards |
|------|----------------------------|----------------------|---------------------|-----------------|-----------|
|      |                            | <i>T. cordifolia</i> | <i>T.malabarica</i> | <i>T.crispa</i> |           |
| 1    | Total ash                  | 2.3%                 | 0.67%               | 0.27%           | NMT 5%    |
| 2    | Acid insoluble ash         | 0.86%                | 0.13%               | 0.03%           | NMT 1%    |
| 3    | Alcohol soluble extractive | 0.8%                 | 1.8%                | 2.5%            | NMT 2%    |
| 4    | Water soluble extractive   | 2.9%                 | 2%                  | 3.1%            | NMT 3%    |
| 5    | Loss on drying             | 4.1%                 | 17.87%              | 16.44%          | -         |

**Phytochemical Study****Table 4: Showing Phytochemical Analysis of *Guduchi Satwa***

| Constituents                | Tests           | <i>T.cordifolia</i> | <i>T.malabarica</i> | <i>T.crispa</i> |
|-----------------------------|-----------------|---------------------|---------------------|-----------------|
| Alkaloids                   | Dragendroff's   | +                   | +                   | +               |
|                             | Wagner's        | +                   | +                   | +               |
| Flavonoids                  | Ferric chloride | -                   | -                   | -               |
| Saponins                    | Foam test       | -                   | -                   | -               |
|                             | Froth test      | -                   | -                   | -               |
| Glycosides                  | Molisch's test  | +                   | +                   | +               |
| Triterpenoids               | Salkowski test  | -                   | -                   | -               |
| Tannis & Phenolic compounds | Gelatin test    | -                   | -                   | -               |
| Proteins                    | Biuret test     | -                   | -                   | -               |
| Carbohydrates               | Molisch's test  | +                   | +                   | +               |
| Steroids                    | Salkowski test  | +                   | +                   | +               |
| Starch                      | Iodine test     | +                   | +                   | +               |

**Heavy metal analysis****Table 5: Showing heavy metal analysis of *Guduchi Satwa***

| Metal   | <i>T.cordifolia</i> | <i>T.malabarica</i> | <i>T.crispa</i> | Limit (NMT) |
|---------|---------------------|---------------------|-----------------|-------------|
| Lead    | < 1PPM              | <1PPM               | <1PPM           | 10 PPM      |
| Cadmium | <0.1PPM             | <0.2PPM             | <0.1PPM         | 0.3PPM      |
| Arsenic | <1PPM               | <1PPM               | <1PPM           | 3 PPM       |

**Observation on TLC Study****Table 6: Showing Rf values of three species of Guduchi Satwa**

| <i>T.cordifolia</i>                                      | <i>T.malabarica</i>  | <i>T.crispa</i>   |
|--|--|---|
| Under 366 nm and 254 nm<br>Rf values -0.44,0.52,0.6,0.72 | Under 366 nm and 254 nm<br>Rf values 0.22, 0.37, 0.44,0.51 | Under 366 nm and 254 nm<br>Rf values-0.47,0.64, 0.71,0.89 |

**DISCUSSION**

Though all the species of *Guduchi* were collected in the same season, maximum yield of *Satwa* was obtained from *Tinospora malabarica* and *Tinospora crispa* as compared to *Tinospora cordifolia* as shown in table no.1. Table no2 shows, difference in the colour of the *Satwa* as ash grey in *T.cordifolia*, white in *T.malabarica*, milky white in *T.crispa*. Though *Guduchi Satwa* is stated as bitter in taste by recent experts, this study revealed, *Satwa* of all the three species was found to be tasteless. The physico-chemical analysis of all three species test values were found in accordance with the standard as mentioned in Ayurvedic formulary. LOD is found in between 4.1% to 17.8%, suggesting the hygroscopic nature of the drug. Phytochemical studies revealed, presence of Alkaloids, Glycosides, Carbohydrates and Starch in all the three species. Alkaloids and Glycosides are well known inhibitory COX Pathway thereby having an Antipyretic and Anti-inflammatory activity which is attributed to all the three species of *Guduchi*. Heavy metal contamination was found within the standard limits for all the three species, which is due to non-contamination at the source of collection and proper method of preparation.

**CONCLUSION**

*Guduchi Satwa* was prepared according to the classical method mentioned by *Bhavaprakasha*. Organoleptic features were thoroughly examined. Physicochemical studies helped to ensure the purity and strength of the *Satwa* obtained from the plant. The presence of phytoconstituents was confirmed by the phytochemical analysis. From this study it can be concluded that physicochemical and phytochemical studies has revealed that three species has similar report. *Tinospora malabarica* and *Tinospora crispa* give yield which may help to minimize the adulteration in the market. The

obtained data can be used as reference for further studies.

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**Plate 1: Guduchi**



*Tinospora cordifolia*



*Tinospora malabarica*



*Tinospora crispa*

**Plate 1: Preparation of Guduchi Satwa**



*Guduchi stems cut and peeled*



Stems soaked overnight

Decantation

Plate No.2: Colour of Satwa



Plate No.3: TLC Profile

