

Formulation and evaluation of capsule containing Tinosporacordifolia

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ABSTRACT:-Tinosporacordifolia, also referred to as guduchi or giloy, is a herb that strengthens the immune system and is used in Ayurveda to promote vitality. Diabetes, urinary tract infections (UTIs), anemia, jaundice, asthma, heart conditions, and other conditions can all benefit from it. We experimented with the formulation of Tinosporine capsules with just one component and Tinosporacordifolia extract. Additionally, general tests were conducted on the extract and capsule formulations. The assessment of quality concentrated on estimating the levels of tannins, bitters, and polysaccharides. The extract was standardized to include 15.00% polysaccharides, 2.00% tannins, and 2.00% bitters. For tannins and bitters, corresponding values in capsule formulation were suggested to be at least 10.00 mg/capsule, and for polysaccharides, at least 75 mg/capsule. Tinosporacordifolia was verified to be present in the finished capsule formulation using HPTLC fingerprinting. Quantitative assessment of microbiological test parameters and heavy metals improves product quality.

Keywords: Guduchi, Aerial root, Moonseed .

I. INTRODUCTION:

People are becoming less immune these days due to industrialization and rising pollution levels. As a result, they require additional diet-appropriate medications to boost immunity. Because herbal formulations have fewer adverse effects, they are growing in popularity. It is possible to think of "natural" herbs as "safer." Due to their well-known lack of adverse effects when compared to medications, natural compounds with therapeutic potential are steadily garnering attention in clinical research. In their review article, Saha and Ghosh [1] discussed the plant's genetic diversity, its active components that were extracted, and their biological function in disease prevention. Tinosporacordifolia, also referred to as

"Guduchi," has immune-stimulating [2] properties that directly stimulate the immune system through a variety of mechanisms to ward off invading harmful microbes. Tinosporacordifolia exhibits protective effects by immune-modulation, including effects on polymorpho nuclear cells, phagocytes [3], and macrophage function. It contains a polysaccharide that is responsible for immune-stimulating properties; it works by increasing the phagocytic activity of macrophages, producing reactive oxygen species (ROS) [4] in human neutrophil cells, and enhancing the production of nitric oxide (NO). Numerous experimental and clinical studies have demonstrated the immune-enhancing effects of Tinosporacordifolia. Herbal medications are a safe second line treatment.

Chemical composition [5] of Tinosporacordifolia is alkaloids, berberine, bitters-columbine, chasmanthin, palmarin, tinosporon, tinosporic acid, tinosporol and so on. One of the main ingredients in the capsule formulation can be powdered tinosporacordifolia extract. Analytical examination is required to ascertain the product's quality when it is used as a "dietary supplement" or a "Ayurvedic drug." A thorough examination of the extract powder used in the final capsule formulation and the end product—the capsule—was conducted. The final capsule formulation's theoretical values for components such as tannin, bitter, and polysaccharide content were determined based on composition. The formulations were analyzed using the proper techniques, and the outcomes were documented. Tinosporacordifolia extract was verified to be present in the finished capsule formulation using HPTLC fingerprinting. The microbial load in the extract and capsule formulation was assessed. Additional support for ensuring the product's quality comes from the evaluation of heavy metals in the final capsule formulation.

Pharmacological Activities:

Antidiabetic: The stems of *T. cordifolia* may have antidiabetic properties due to a number of constituents, such as alkaloids, tannins, flavonoids, and saponins. Crude extract of the stem was tested in hexane, chloroform, ethyl acetate, and dichloromethane in order to examine the enzyme's inhibitory effects on hypoglycemic and normal mice. In rats, *T. cordifolia* aqueous extract raised triglycerides by 54.12%, insulin by 51.5%, glucose by 21.3%, and the glucose-insulin index by 59.8%. Several extracts have been linked to diabetic patients in in vivo testing

Antioxidant: Mehra and his research team looked into the antioxidant activity in various *T* components to learn why people with various illnesses have been using different parts of this amazing plant since ancient times.

Antimicrobial: In vitro experiments have demonstrated that *T. cordifolia* is effective against both gram-positive and gram-negative bacteria, and it has been asserted that it possesses antibacterial properties in a range of solvents.

Anti-Proliferative: Researchers used a response surface methodology to ascertain whether *T. cordifolia* extract is beneficial against cancer. In an animal model of skin cancer caused by DMBA, the extract suppressed the growth of the tumor. For 30 days, 750 mg/kg body weight of a 50% methanolic extract of *T. cordifolia* was given to C57 BI mice; the outcomes were comparable to those obtained when the extract was prepared at 200, 400, and 600 mg/kg dry weight. The chance of dying rose in tandem with the tumor's growth.

Anti-HIV: An extract from the roots of *T. cordifolia* may make people with HIV feel more comfortable in their living arrangements. Because *T. cordifolia* stem concentrate can lower hemoglobin levels, polymorphonuclear leucocytes, B lymphocyte and macrophage activation, and eosinophil counts, it may have substantial anti-HIV potential.

Wound Healing: Studies found that dexamethasone decreased the alcoholic extract of *T. cordifolia*'s wound healing profile and its impact on wound healing. The *T. cordifolia* extract's increased flexibility, which might be related to the development of collagen combination, enhanced the plant's ability to heal wounds. The detrimental effects of dexamethasone on wound healing were not mitigated by *T. cordifolia* extract.

Anti-Cancer: Research on animals has shown that *T. cordifolia* possesses anti-cancer properties. Using response surface methodology (RSM), the alkaloid palmatine isolated from *T. cordifolia* exhibits clear anticancer potential in a mouse model of skin cancer caused by 7,12-dimethylbenz(a)anthracene (DMBA). One administration of *T. cordifolia* extract at 200, 400, or 600 mg/kg dry weight 24 hours prior resulted in a significant decrease in the quantity of micronuclei in the bone marrow of mice who had received cyclophosphamide (50 mg/kg) intraperitoneally.

Advantages of capsule:

- Capsule make the taste and odour of unpleasant drugs and can be easily administered.
- They are slippery when moist and hence easy to swallow with a water
- As compared to tablets less adjuncts are required
- The shells are physiologically inert and easily and quickly digested in the gastrointestinal tract
- They are economical
- They are easy to handle and carry
- The shells can be opacified (with titanium dioxide) or coloured, to give protection from light.

Disadvantages of capsule:

- The drugs which are hygroscopic absorb water from capsule shell making it brittle and hence are not suitable for filling into capsule.
- The concentrated solutions which require previous dilution are unsuitable for capsules because if administered as such lead to irritation of stomach .

Classification of capsule:

1. **Soft gelatin:** A soft gelatine capsule is a type of capsule that is usually used to contain medicine in the form of liquid or powder, and which dissolves more quickly than a hard gelatin capsule.
2. **Hard gelatin:** Hard capsules consist of two pieces that fit together, while soft capsules have a flexible plasticized gelatin shell.

Evaluation of capsules:

1. Weight variation test
2. stability test
3. Disintegration test
4. Dissolution test
5. Moisture permeation test
6. Shell integrity test

Active constituents of Tinospora Cordifolia :

Table No.1: Active constituents

Sr. no	Type of active component	Source	Compounds	Biological response	References
1.	Alkaloids	Root, stem	Berberine, choline, palmatin, Tinosporin, and Isocolumbin	Anticancer, antiviral infection, neurological responses and Diabetes	Saxena and Rawat et al., 2019
2.	Steroids	Stem aerial parts	Beta-sitosterol	Induce osteoporosis in patients with early inflammatory arthritis	Arshad et al., 2018
3.	Glycosides	Stem	Tinocordiside, Cordioside	Treats Parkinson's disease and other Neurological disorders	Arshad et al., 2018
4.	Alliphatc compound	Whole plant	octacosanol	Anti-inflammatory, anti-nociceptive	Khan et al., 2016
5.	Diterpenoid	Whole plant	Furanolactone	Anti-inflammatory, antimicrobial, antihypertensive, antiviral	Saxena and Rawat et al., 2019
6.	Others	Root	Giloin, Tinosporic acid	Used to treat anxiety, HIV protease inhibitors	Promila et al., 2017

Plant profile:

Common name: Giloy

Scientific name: Tinospora

Kingdom: Plantae

Unranked: Angiosperms

Unranked: Eudicots

Order: Ranunculales

Family: Menispermaceae

Genus: Tinospora

Species: Tinosporacordifolia

Table no.2.Analytical finding of tinosporacordifolia :

Sr no.	Test parameter	Lot 1 Te/14/1051	Lot 2 Kg 475	Lot 3 Kg 154	Lot 4 Kg 173
1.	Description	Brown coloured powdered	Brown coloured powder	Brown coloured powder	Brown coloured powder
2.	Loss on drying at 105 degreeC(% W/W)	3.35	3.88	2.41	5.59
3	Total ash (%w/w)	11.82	6.42	6.43	6.68
4.	Water soluble extractive d/b(% w/w)	88.62	96.18	89.83	93.42
5.	Content of tannin(% w/w)	2,50	2.58	2.53	2.66
6	Content of bitter on d/b(not less than 2.00% w/w)	2.29	2.60	2.65	2.12
7.	Content of polysaccharide(not less than 15% w/w)	22.13	22.13	23.50	22.20

Method of extraction :-

Maceration: In this process the powdered tinosporacordifolia is placed in a container with the chosen solvent e.g.ethanol,methanol,etc. and let let to stand ,often agitated,for at least three days(or upto 7 days), until the soluble matter dissolves. After the maceration period , the mixture is filtered through a suitable filter to separate the solid plant material from solvent containing the extracted compounds.the clear filtrate is then concentrated using method like evaporation in a water bath.

Formulation:

Preparation of Herbal extract:

- 1 Start by collecting the stems,washing them to remove dirt and chopping them in pieces.
- 2.then dry chopped pieces under shade for a week ,or use a an oven at low temperature like 60c for 6hr .
- 3.finally grind the dry pieces into a fine powder using a grinder or blender.
4. sieving the ground powder can be passed through a sieve to ensure uniformity and remove any large piceses
- 5.Different solvents like methanol or ethanol can be used for extraction,depending on the desired compounds to be extracted.



Fig no.1: process of extraction

Preparation of capsule:-

Place empty gelatin capsules on a removable plate, ensuring the bodies face downwards. Carefully separate the caps from the bodies of the capsules. Use a spatula to fill the

capsule bodies with the powder formulation. Carefully remove an excess powder from the open end of the capsule body. Join the caps to the bodies to close the capsules. Once the capsules are filled and closed, they can be ejected.

Table no.3: formulation table

Each capsule contains	Tinosporacordifolia (guduchi extracts)	500.00mg
	Excipients	q.s

Evaluation parameter of developed formulation:

Table no.4: analytical findings of tinosporine capsule

Sr.no.	Test parameters	Analytical findings of lot 1	Analytical findings of lot 2	Analytical findings of lot 3
1.	Description ("5" size capsule filled with brown coloured powder)	complies	complies	complies
2.	Disintegration time	15	16	133
3.	Average weight	160.23	158.11	156.10
4.	Filled average time	150.27	149.21	148.15
5.	Dissolution time	24	26	28

Results :

Fig.no.2:HPTLC fingerprinting of Tinosporine capsule

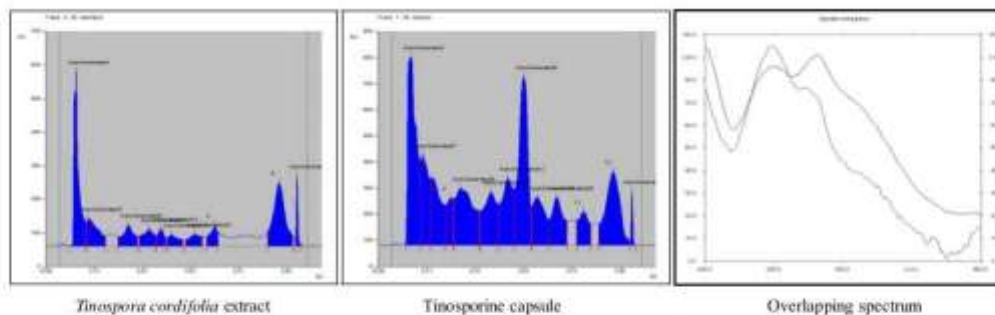


Fig 2: HPTLC Fingerprinting of Tinosporine capsule







<i>Tinospora cordifolia</i> extract (Under 254nm)	Tinosporine capsule (Under 254nm)	Rf value	<i>Tinospora Cordifolia</i> extract (Under 366nm)	Tinosporine capsule (Under 366nm)	Rf value	<i>Tinospora Cordifolia</i> extract (After spraying)	Tinosporine capsule (After spraying)	Rf value
		Dark spot at Rf about 0.25			Yellow spot at Rf about 0.08			Blue spot at Rf about 0.25

Fig no.3: Capsule



Table no.5.:Tests for alkaloids

Sr.no	Phytochemical constituents	result
1.	alkaloids	present
2.	glycoside	present
3.	steroids	present
4.	Aliphatic compounds	present

II. CONCLUSION:

Despite the fact that Guduchi, or *Tinosporacordifolia*, has a large number of active ingredients, we have measured a small number of functional groups and displayed their relative values in the extract powder and capsule formulation. *Tinosporacordifolia* extract is included in the capsule formulation thanks to qualitative testing using the HPTLC method. The combined test findings show that the finished product, *Tinosporine* capsules, and the raw material, *Tinosporacordifolia* extract, comply with the quality standards. A significant number of polysaccharides, approximately 100 mg/capsule, and more than 10 mg/capsule of tannins and bitters provide the capsule formulation an extra degree of quality.

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