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Phytochemical Detection in Mixture of Leaves and Stems of *Cissus Quadrangularis* from Eastern Part of Arunachal Pradesh

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ABSTRACT

All forms of plants are naturally endowed with one or the other ethnomedicinal properties. Medicinal plants are the focus of modern scientific research due to their therapeutic properties and minimal side effects compared to synthetic drugs. The identified medicinal plants are extracted for biochemical screening and engineered for medicinal uses. *Cissus Quadrangularis* is a known ethno-medicinal plant rich in bioactive agents; however, as biodiversity and landscape of different regions dictate the quality and quantum of their medicinal values; attempt has been made to undertake a preliminary qualitative profiling of its secondary metabolites from the land of rising sun as the source. The fresh and young leaf and stem samples were collected and washed thoroughly with sterile double distilled water (DDW).

About twenty grams of sterilized leaf and stem samples were taken and cut into small pieces and were left for shade drying. Finely cut parts of leaves and stems were placed in a 500 ml Erlenmeyer flask containing 50ml of sterile DDW. After that, the mixture was transferred to Soxhlet apparatus to derive extracts using different solvents- water, acetone, chloroform and methanol. The ethnomedicinal plant extracts were tested for phytochemicals using standard protocol. In this study, the secondary metabolites such as phenol, alkaloids, tannins and flavonoids were present in the various extract of *C. Quadrangularis.* This will pave the way for further studies and formulation of an effective medicine.

KEYWORDS: *Ethnomedicinal, Cissus Quadrangularis, ethnomedicinal plant extract, phytochemicals.*

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INTRODUCTION

Ethnomedicine refers to the totality of health, knowledge, skills, values, beliefs, and practices of members of the traditional society, including all the clinical and non-clinical activities that narrate their health needs (Foster et al. 1978). According to WHO (World Health Organization), "medicinal plant is a plant, within which one or more of its parts contains the substances, which can be further used for various therapeutic purposes, and serves as a precursor for chemo-pharmaceutical semi-synthesis" (Suriyavathana et al., 2011). Due to their pharmacological traits and realistically negligible side effects in comparison to synthetic drugs medicinal plants are the centre of attention for modern day research. The ethnomedicinal plants play a significant role in the lives of rural people of tribal areas of India (Raghuvanshi et al. 2021). Arunachal Pradesh is the largest State of North-East India which is endowed with a rich heritage of biological and cultural diversity. *Cissus Quadrangularis* is one such traditional plant found specially in the eastern belt of the state.

Cissus quadrangularis is a climbing succulent belonging to the grape - Vitaceae family, dominantly prevalent in tropical and sub-tropical regions. Although it is commonly called as a HADJOD, meaning 'bone-setter', it has wide range of applications, particularly in Ayurveda, Unani and Siddha forms of medicines as an analgesic, tonic, anthelmintic, dyspeptic, digestive, irregular menstruation, asthma etc. In Assamese it is called as 'Harajora Lota', meaning "A climber that binds". Recent modern studies have indicated its many diverse pharmacological efficacy as a free radical scavenging, anti-microbial, anti-ulcer activity, anti-

inflammatory and stimulatory activity, anti-obesity activity, anti-pyretic activity etc. It is traditionally used in Ayurvedic medicine for promoting fracture healing and is known to enhance osteoblast differentiation, crucial for bone regeneration (Farjana & Valiathan, 2025) (E., 2022).

(Justin S. Raj et al 2011) reported that it is a rich source of flavonoids, triterpenoids, Vitamin C, stilbene derivatives and many others, e.g. resveratrol, piceatannol, pallidol perthenocissin and phytosterols, ascorbic acid, triterpene, β-sitosterol, ketosteroid, two asymmetrical tetracyclic triterpenoids Carotene A, anabolic steroidal substances and calcium were identified as major constituents of this plant (Duenpim P. et al 2000). The main chemical constituents are tetracyclic triterpenoids, onocer-7-ene-3alpha, 21 beta-diol and onocer-7-ene-3beta, 21 alpha-diol and two steriodal principles I and II, alpha-sitosterol, delta-amyrin.

The stem contains two asymmetric tetracyclic triterpenoids, and two steroidal principles. The presence of β-sitosterol, δ-amyrin, δ-amyrone, and flavonoids (quercetin) having different potential metabolic and physiological effects have also been reported (Jakikasem, S. et al, 2000). Cissus quadrangularis is rich in vitamin C and beta-carotene. Analysis showed that Cissus contained Ascorbic acid at a concentration of 479 mg, and carotene 267 units per 100g of freshly prepared paste, in addition to calcium oxalate (Jainu, M. et al, 2004).

Materials and Methods

The stems and leaves of plant Cissus quadrangularis, was collected from the residence of *Chau Likham Pomoung* of Innao Pather of Diyun Circle in Changlang District of Arunachal Pradesh which were identified and authenticated by Dr. Phongam Tesia, Assistant Professor and Head, Department of Botany, IGG College, Tezu (A.P). *C. Quadrangularis* were collected in the month of August and dried in shade. *C. Quadrangularis* were coarsely powdered and used for preparation of extract. The powder of *Cissus quadrangularis* was subjected to successive solvent extraction using Soxhlet apparatus, the powder was extracted with chloroform, acetone, methanol and water. The extracts were filtered through No. 4 Whatman filter paper which were then evaporated at 37°C to dryness, and stored at 37°C for further use.

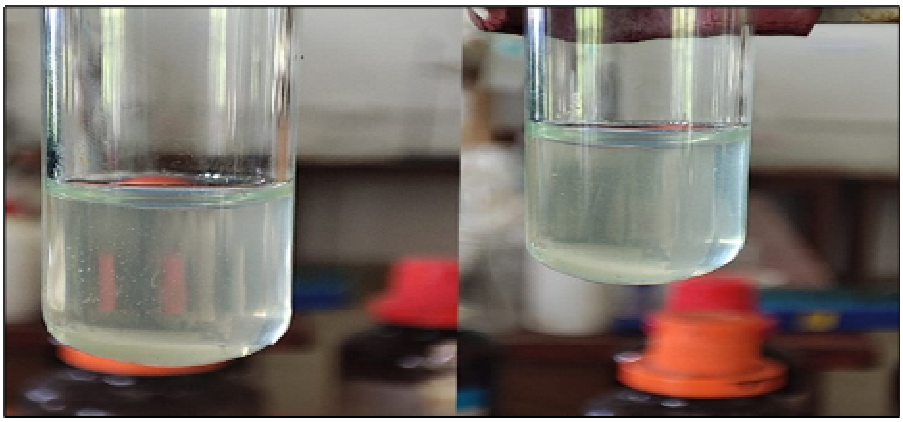
Sl. no.	Name of extracts	Colour	Physical Nature	% yield (w/w)
1	Aqueous	Brown	Sticky	5.4
2	Methanol	Green	Sticky	4.7
3	Chloroform	Green	Sitcky	3.3
4	Acetone	Green	Sticky	5.1

Table 1: Nature and percentage yield of the extracts

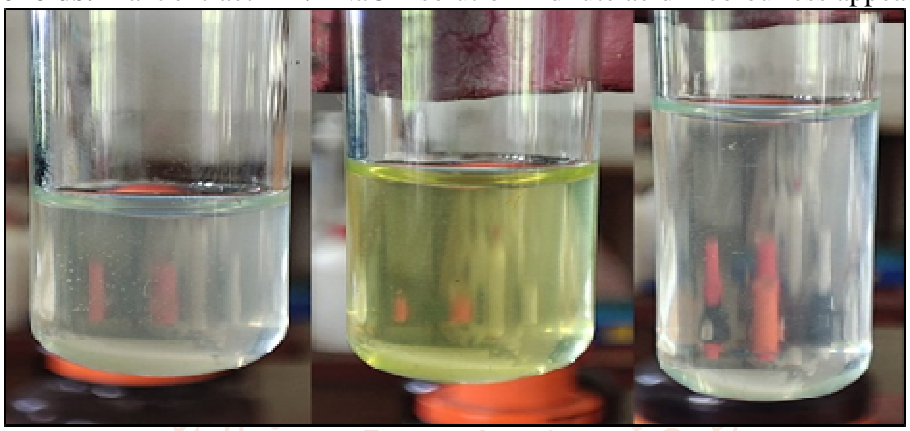
Results and Discussions

Some tests undertaken are highlighted as follows:

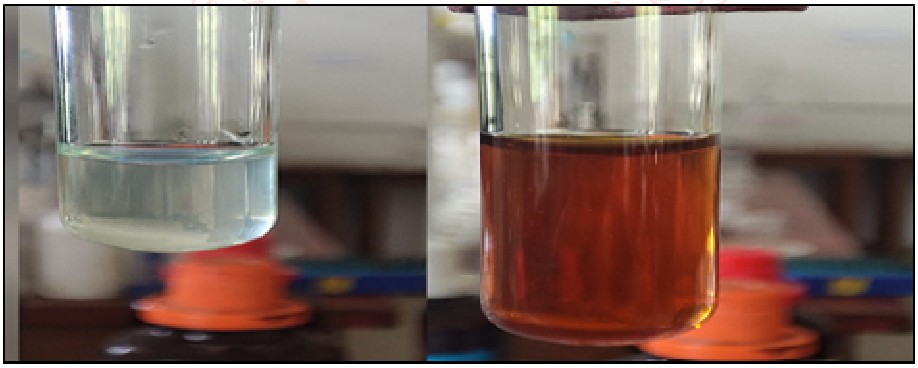
1. **Saponin test:** Some volume of the plant extract was taken in a conical flask and mixed with distilled water. Stable soapy foam is observed.



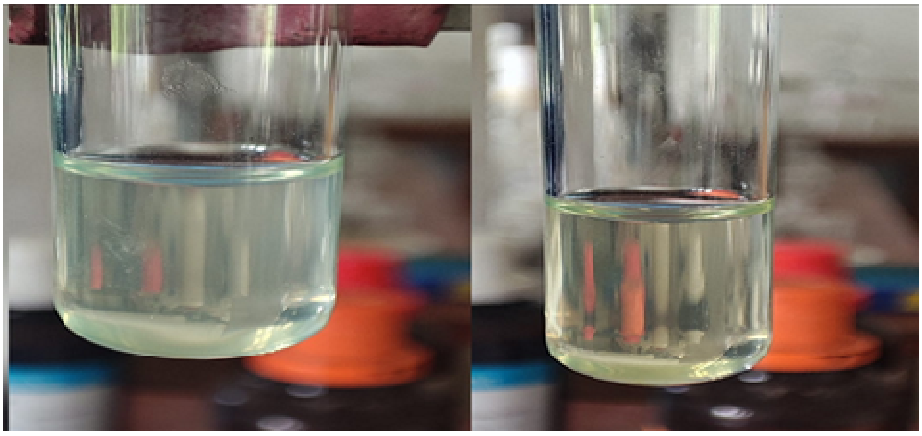
2. **Test for flavonoids:** Plant extract + 2% NaOH solution + dilute acid = colourless appearance.



3. **Test for alkaloids:** Plant extract + 1% HCl + heat + drops of Wagner's reagent = Reddish brown precipitate observed.



4. **Steroid test:** Plant extract + glacial acetic acid + 2% $FeCl_3$ mixed with concentrated H_2SO_4 = No brown ring is observed.



The pharmacological activity of any plant is useful due to presence of chemical constituents. So, *Cissus Quadrangularis* possesses various phytochemical and pharmacological properties. The dried powder of stem and leaf of *Cissus Quadrangularis* was extracted with successive solvent extraction using various solvents such as Chloroform, Acetone, Methanol and water.

Phytochemical tests determined that % yield (w/w gm) of extract of plant was high in aqueous extract and lowest in chloroform extract. Soxhlet apparatus was used to perform extraction the results of the extract are mentioned in table 1. The various mixture of stem and leaf extract of the plant were subjected to phytochemical screening which reveal the presence of various pharmacologically bioactive constituents.

Sl. no.	Phytochemicals	Aqueous Extract	Methanol Extract	Acetone Extract	Chloroform Extract
1	Alkaloids	✓	✓	✓	✓
2	Saponins	✓	✓	✗	✓
3	Tannins	✗	✓	✗	✓
4	Flavonoids	✓	✓	✓	✓
5	Steroid	✗	✗	✗	✗

[Abbr.: ✓ (Present), ✗(Absent)]

Table 2: Preliminary phytochemical screening of dry leaf and stem extracts of Cissus Quadrangularis

Conclusion and Prospects

It is a known fact that *C. Quadrangularis* is a curative agent for various diseases. So, there is the requirement to investigate the biological activity of its Phyto-constituents at molecular level to exhibit its unexplored potential for development of an effective, safe and cheap herbal drug.

In the contemporary era of Nano-Science and Technology, the presence of secondary metabolites is an indication of inherent reducing, capping and stabilizing agents which could potentially convert metal salt solutions into metal nanoparticles to enhance its applications. The quantitative estimation of these phytochemicals and synthesis are in progress.

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