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## Physiochemical analysis and phytochemical screening of ivy gourd, *Coccinia grandis* (L.) Voigt leaves

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### Abstract

Medicinal plants contain bioactive compounds which are responsible for treating various diseases. In the present study, physiochemical parameters and phytochemical screening of ivy gourd, *Coccinia grandis* (L.) Voigt leaves were investigated. The physiochemical parameters such as moisture content (8.3% w/w), total ash (19.6% w/w), acid insoluble ash (1.1% w/w) and water soluble ash (7.55% w/w) were determined. The extractive value of ivy gourd leaf extract in aqueous solvent was found to be maximum (12.16% w/w) than methanolic extract (8.96% w/w), ethanolic extract (6.48% w/w), chloroform extract (4.16% w/w), acetone extract (3.44% w/w) and ethyl acetate extract (2.48% w/w). Phytochemical screening of ivy gourd leaf extract was carried out using different solvents namely methanol, ethanol, aqueous, acetone, ethyl acetate and chloroform. Phytochemicals such as carbohydrates, reducing sugar, amino acid, steroids, glycosides, alkaloids, tannins, saponins, phenols and flavanoids were found to be present. These phytochemicals are the reason for medicinal value of ivy gourd leaves and can be used as dietary adjunct in our day to day life.

**Keywords:** *C. grandis* (L.) leaves, phytochemicals, extractive value

### Introduction

Medicinal plants are considered as rich sources of traditional medicines in all the culture and it has been used to treat various health disorders, to add flavor, conserve food and to prevent disease epidemics since so many years [3, 11]. Moreover, herbal remedies are cheaper than conventional medicine and have significantly contributed to rural livelihood [9]. About 80% of the world population in developing countries relies on traditional medicine for their primary health care needs [13]. The biological property of medicinal plant is due to the presence of phytochemicals such as alkaloids, phenols, flavanoids, tannins, steroids, saponins, terpenoids etc. that are produced during plant metabolic process [11].

Ivy gourd, *Coccinia grandis* (L.) voigt (Cucurbitaceae) is a fast growing perennial vine and has been extensively used in Indian medicinal systems such as ayurvedic, unani and siddha. Ivy gourd is an indigenous plant of central Africa and Asia and is widely cultivated as a vegetable in India [14]. Almost every part of the plant including fruits, young leaves and shoot tips are used for cooking purpose in Asia [12]. Ivy gourd leaves varies from heart to pentagon shape and are used to treat Skin diseases such as ring worm, psoriasis etc., chronic sinuses, diabetes, gastro-intestinal (GI) disorder, urinary tract infection (UTI) and respiratory diseases. Flowers are large, white and star-shaped. The fruit is red, ovoid to elliptical shaped and cures tongue sores and eczema. The roots and stems are succulent, tuberous and most likely facilitate the plant to survive prolonged drought. The stem possess anti-spasmodic effect, anti-diabetic effect and treats GI disorder, UTI and useful in asthma and bronchitis also. The roots of ivy gourd are used in treating arthritis, mouth ulcers, Wheezing and phlegm, skin lesions (Tenia) etc. [8, 10].

*C. grandis* (L.) leaves possess certain biological properties namely anti-diabetic, anti-microbial, anti-fungal, anti-oxidant, anti-hypertensive, anti-ulcer, analgesic, anti-pyretic and anti-cancer properties [10, 12, 14] due to the presence of phytoconstituents. Therefore, detailed screening of medicinal plants is required for the discovery and development of novel bioactive agents that would help in reducing human sufferings [5]. The present study investigates physiochemical parameters and phytochemical screening of ivy gourd leaf extract using different solvents including ethanol, methanol, aqueous, ethyl acetate, acetone and chloroform.

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## Materials and methods

### Sample collection

Fresh leaves of *Coccinia grandis* (L.) were collected from the local region of Pantnagar, Uttarakhand, India. Botanical identities of the collected leaves were confirmed by the description given by Imbumi, (2004) [4].

### Processing of ivy gourd leaves

The collected leaves were examined for extraneous matter and removed. The sorted healthy leaves were gently washed with the running tap water. Then the cleaned leaves were spread on aluminium trays and kept in a hot air oven at a temperature of 40 °C for 5 hours. After drying, the leaves were crushed using electric blender. Then the powdered sample was stored in airtight container and kept in dark and cool place.

### Physicochemical analysis

Physicochemical parameters were determined as described by Attanayake *et al.*, (2016) [1].

### Extraction of plant material

Plant extract was prepared by macerating 25 g of dried sample with 250 ml of each solvent viz., ethanol, methanol, aqueous, acetone, ethyl acetate and chloroform for 24 hours. The contents were shaken frequently during the first 6 hours and allowed to settle down for next 18 hours. The extracts were then filtered rapidly through whatman No.1 filter paper. The filtrate obtained was concentrated to half of its original volume taken; using water bath and then it was further used for qualitative analysis of phytochemicals. Per cent yield of all the extracts (% w/w) was determined and documented.

### Percent Extractability

The percent extractability of *C. grandis* (L.) leaf powder was calculated by the following formula,

$$\text{Extractability (\%)} = \frac{\text{Weight of dried extract}}{\text{Weight of sample taken}} \times 100$$

### Phytochemical investigation

Phytochemical screening was carried out using standard protocols.

### Test for carbohydrates

**Molisch's test:** 3 ml of extract was taken in a test tube and two drops of alcoholic alpha naphthol solution was added, shaken well and then 1 ml of concentrated sulfuric acid was added carefully along the sides of the test tube. Formation of violet ring at the junction indicates the presence of carbohydrates.

### Test for reducing sugar

**Fehling's test:** To 1 ml of the extract, add equal quantities of Fehling solutions A and B and heated for 2 minutes. Formation of brick red precipitate confirmed the presence of sugars.

### Test for amino acids

**Ninhydrin test:** 3 ml of plant extract solution was heated followed by addition of 3 drops of 5% ninhydrin solution. The test tubes with this solution were kept in boiling water bath for 10 minutes. Formation of purple colour indicates the presence of amino acids.

### Test for Steroids

**Salkowski test:** 1 ml of the extract was dissolved in 10 ml of chloroform and equal volume of concentrated sulphuric acid was added by sides of the test tube. Formation of brown colour indicates the presence of steroids.

### Test for Glycosides

**Keller-Kiliani test:** 5 ml of extract was dissolved in 2 ml chloroform. To that few drops of diluted H<sub>2</sub>SO<sub>4</sub> was added to form a layer. A brown colour indicates the presence of glycosides.

### Test for Alkaloid

**Wagner's test:** 1.27 gm iodine and 2 gm potassium iodide were dissolved in 5 ml of distilled water and this was further diluted into 100 ml distilled water. To this 2 ml of filtrate was added. Appearance of brown flocculent precipitate indicates the presence of alkaloids.

### Test for Tannins

**Ferric Chloride Test:** 5 ml solution of the extract was taken in a test tube. Then 1 ml of 5% Ferric chloride solution was added. A green coloration in the filtrate of extract indicates the presence of tannins.

### Test for Saponins

**Frothing test:** 5 ml of extract was mixed with 20 ml of distilled water and then agitated in a graduated cylinder for 15 minutes. Formation of foam indicates the presence of saponins.

### Test for Phenols

**Ferric chloride test:** To 2 ml of extract, 2 ml of 5% aqueous ferric chloride was added. Formation of blue colour indicates the presence of phenols.

### Test for Flavonoids

**H<sub>2</sub>SO<sub>4</sub> test:** A fraction of extract was treated with concentrated sulfuric acid and observed for the formation of reddish or orange colour.

## Results and discussion

### Physicochemical analysis of ivy gourd leaves

The physicochemical parameters of ivy gourd leaves such as moisture content, total ash, acid insoluble ash and water soluble ash were estimated and summarized in Table 1. The values obtained were within the prescribed limits as stated by Indian Ayurvedic Pharmacopoeia. These physicochemical parameters can be used as reference standards for the assessment of quality control parameters of the plant [1].

**Table 1:** Physicochemical analysis of ivy gourd leaves

Parameters	Values % (w/w)
Moisture content	8.3
Total ash	19.6
Acid insoluble ash	1.1
Water soluble ash	7.55

### Determination of extractive value of ivy gourd leaf extract

The extractive value of ivy gourd leaf extracts was determined and presented in Table 2. It was found that, the extractive value of ivy gourd leaf extract in aqueous solvent was found to be maximum (12.16% w/w) than methanolic extract (8.96% w/w), ethanolic extract (6.48% w/w), chloroform extract (4.16% w/w), acetone extract (3.44% w/w)

and ethyl acetate extract (2.48% w/w). Extractive value determines the amount of the active constituents present in a given amount of plant material on extraction with solvent.

**Table 2:** Determination of extractive value of ivy gourd leaf extract

Solvents	Extractive Value % (w/w)
Methanol	8.96
Aqueous	12.16
Ethanol	6.48
Acetone	3.44
Ethyl acetate	2.48
Chloroform	4.16

### Phytochemical Screening of ivy gourd leaf extract

In the present study, preliminary phytochemical screening was carried out in ivy gourd leaves using different solvent extracts viz. methanol, ethanol, aqueous, acetone, ethyl acetate and chloroform and those were indicated in table 3. Methanolic leaf extract indicates the presence of amino acid, steroids, glycosides, alkaloids, tannins, saponins, phenols and flavanoids. Ethanolic extract of ivy gourd leaves shows the presence of carbohydrate, reducing sugar, amino acid,

steroids, alkaloids, saponins, phenols and flavanoids. Aqueous leaf extract indicates the presence of carbohydrate, reducing sugar, amino acid, glycosides, tannins, saponins and phenols. Chloroform leaf extract was found to contain steroids, glycosides, tannins and saponins. Leaf extract obtained by acetone revealed the presence of steroids, glycosides, saponins and phenols. And leaf extract of ethyl acetate shows the presence of carbohydrate, reducing sugar and phenols. Among all the solvent, alcoholic and aqueous extract was found to be the best which revealed the presence of almost all the phytoconstituents analyzed.

Phytochemicals detected under the present study were biologically active compounds which exhibit medicinal properties and also play a vital role in phytotherapy. The methanolic extract of ivy gourd leaves possess anti-inflammatory activity on carageenan induced rat paw oedema model [2]. Ivy gourd leaf powder showed a significant dose related decrease in ulcer index, with significant increase in mucus secretion and decrease in level of lipid peroxidation and superoxide dismutase activity on aspirin induced gastric ulcer model in rats [7]. *C. grandis* (L.) leaves has a blood sugar lowering effect [6].

**Table 3:** Phytochemical Screening of ivy gourd leaf extract

Pytochemical	Methanol	Ethanol	aqueous	Chloroform	Acetone	Ethyl Acetate
Carbohydrate	-	+	+	-	-	+
Reducing sugar	-	+	+	-	-	+
Amino acid	+	+	+	-	-	-
Steroids	+	+	-	+	+	-
Glycosides	+	-	+	+	+	-
Alkaloids	+	+	-	-	-	-
Tannins	+	-	+	+	-	-
Saponins	+	+	+	+	+	-
Phenols	+	+	+	-	+	+
Flavanoids	+	+	-	-	-	-

(+ Present; - Absent)

### Conclusion

From the present study, it is concluded that all the physiochemical parameters of Ivy gourd leaves were found to be within the prescribed limits of Indian Ayurvedic Pharmacopoeia and could be used as reference tool for standardization of plant. Through extractive values, it is possible to find the effective solvent for extraction process. In the present study, aqueous solvent was found to be the most effective among the solvents used. The phytochemical screening of ivy gourd leaf extract confirms the presence of bioactive compounds which possess certain biological properties. Due to the presence of phytoconstituents ivy gourd leaves can be used as functional food sources for the treatment of diabetes mellitus, inflammation, ulcer, fever etc.

### References

- Attanayake AP, Arawwawala LDAM, Jayatilaka KAPW. Chemical standardization of leaf extract of *Coccinia grandis* (L.) Voigt (Cucurbitaceae) of Sri Lankan origin. Journal of Pharmacognosy and Phytochemistry. 2016; 5(5):119-123.
- Chatterjee A, Chatterjee S. Proximate analysis, phytochemical screening and anti-inflammatory activity of *Coccinia indica*. IJPCBS. 2012; 2(3):299-304.
- Dar RA, Shahnawaz M, Qazi PH. Natural product medicines: A literature update. J Phytopharmacol. 2017; 6(6):349-351.
- Imbumi MD. *Coccinia grandis* (L.) Voigt In: Grubben, G.J.H. & Denton, O.A. (Editors). PROTA 2: Vegetables/Légumes. [CD-Rom]. PROTA, Wageningen, Netherlands, 2004.
- Kumar S, Paul S, Walia YK, Kumar A, Singhal P. Therapeutic Potential of Medicinal Plants: A Review. J Biol. Chem. Chron. 2015; 1(1):46-54.
- Munasinghe MAAK, Abeysena C, Yaddehige IS, Vidanapathirana T, Piyumal KPB. Blood Sugar Lowering Effect of *Coccinia grandis* (L.) J. Voigt: Path for a New Drug for Diabetes Mellitus. Experimental Diabetes Research 2011; 2011, Article ID 978762, 4p.
- Mazumbder PM, Sasamal D, Nambi RA. Antiulcerogenic and antioxidant effects of *Coccinia grandis* (Linn.) Voigt leaves on aspirin induced gastric ulcer in rats. Natural Product Radiance. 2008; 7(1):15-18.
- Nautiyal R, Chaubey S, Singh R, Verma S. A critical review on Bimbi W.S.R. to its medicinal uses and pharmacological activity. EJBPS. 2018; 5(8):181-185.
- Njerua SN, Matasyoh J, Mwaniki CG, Mwendia CM, Kobia GK. A Review of some Phytochemicals commonly found in Medicinal Plants. International Journal of Medicinal plants Photon. 2013; 105:135-140.
- Pekamwar SS, Kalyankar TM, Kokate SS. Pharmacological activities of *Coccinia grandis* - a review. J App. Pharm. Sci. 2013; 3(05):114-119.
- Singh R. Medicinal Plants: A Review. Journal of Plant Sciences. 2015; 3(1-1):50-55.

12. Tamilselvan N, Thirumalai T, Elumalai EK, Balaji R, David E. Pharmacognosy of *Coccinia grandis* - a review. Asian Pac. J Trop. Biomed. 2011; 1:S299-S302.
13. WHO, WHO Traditional Medicine Strategy 2002-2005, World Health Organization, 2002.
14. Yadav G, Mishra A, Tiwari A. Medical properties of Ivy Gourd (*Cephalandra indica*) – a review. Int. J. Pharm. Res. Dev. 2010; 2:92-98.