



Research Article

PRELIMINARY PHYTOCHEMICAL ANALYSIS OF WHOLE PLANT POWDER OF *INDONEESIELLA ECHIOIDES* (L.) SREEM.

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ABSTRACT

The plant *Indoneesiella echioides* (L.) Sreem. belonging to the family *Acanthaceae*, is a less known medicinal plant widely distributed in the Tropical India and Srilanka. The only mentioning of this drug is in the *Hortus Malabaricus*, a treatise on the plant wealth of Malabar during the 17th century. The reference depicted is for fever and poison indicating the time old application of the drug by traditional Ayurvedic practitioners. The drug is neither included in Ayurvedic pharmacopeia nor currently been used in Ayurvedic practice. Research works of the drug is done mostly with extracts of leaves and aerial parts. This paper deals with the preliminary phytochemical analysis of the whole plant powder. Apart from the available results of qualitative analysis, quantitative determination of fiber content, tannin content, total sugars, reducing sugars, phenols, extractive values and successive solvent extraction of the whole plant powder has been done in this study. The results obtained for the quantitative determination of tannins, total sugars, reducing sugars and phenols were 3.187%, 10.99%, 4.11% and 27.979 microgram/gram respectively. Variations were noted in the physico-chemical parameters such as total ash (6.77%), moisture content (9.55%) and crude fiber content (50.866%) comparing to the corresponding values of leaves extract. The influence of regional climatic conditions, (*Desapradhanyata*) is also evident from the study. Among the extractive values, water soluble extractives exceeded the alcohol soluble extractives which revalidate the usage of water based formulations in Ayurvedic science.

KEYWORDS: *Indoneesiella echioides* (L.) Sreem., *Hortus Malabaricus*, Ayurveda, whole plant.

INTRODUCTION

Ayurveda existing today is the result of year's long experiences of our great ancestors. They were always enthusiastic in incorporating even the minute piece of information to the Ayurvedic legacy. The process went through continuous scrutiny in the minds of scholars and they were given a scientific background in all the possible ways. In the present day also tremendous work is going on by adding new drugs to the Pharmacopoeia. Also some drugs are yet to find their space in general practice. So it is our duty to explore the therapeutic potential of such herbs so that the information gathered may be beneficial to the society.

The present experimental plant *Indoneesiella echioides* (L.) Sreem. belonging to the family *Acanthaceae*, is a less known medicinal plant commonly called as 'False water willow'. It is widely distributed in the Tropical India and Srilanka. There is mentioning of the usage of this drug in the *Hortus Malabaricus*, indicating the time old application of the drug by traditional Ayurvedic practitioners.^[1] This is a 12-volume treatise on the plant wealth of Malabar (which stretches from Goa to Kanyakumari, about 900 km in length and varying from 74 to 200 km in width) published in Latin language during the period 1678-1693 from Amsterdam. The book was compiled and promoted by Commodore Hendrik Adriaan Van Rheede, the then Dutch Governor of Cochin with the helping hands from Itty Achuden a famous *Collatt Vaidyan*,

(Dr.) at that time. The medicinal uses of plants mentioned in *Hortus Malabaricus* were culled from the ancient palm leaf manuscripts ('*Cholketta pusthakam*') of the "*Collatt Vaidyas*"^[2]. The book comprises of 742 most famous traditional medicinal plants of the region, the diseases in which they are used the method of preparation and application of the drugs^[3-5]. Its leaves are said to be antidote to poison when employed externally and juice specific in cold and fevers.

Phytochemical screening of this drug has been done by K Nirubama et al., (2014)^[6], Raama Murthy et al., (2012)^[7], Sermakkani et al. (2011)^[8], Padma et al., (2012)^[9], Ramasubramania Raja et al (2014)^[10] and Anandanayaki and Uma (2014)^[11] using various extracts of leaves and aerial parts. Apart from the available results of qualitative analysis, quantitative determination of fibre content, tannin content, phenols, total sugars, reducing sugars, extractive values and successive solvent extraction has been done in this study.

Collection of the plant

The plant, *Indoneesiella echioides* (L.) Sreem. was pharmacognostically identified in the Department of Dravyagunavijnanam, Government Ayurveda College, Tripunithura. The whole plant, *Indoneesiella echioides* (L.) Sreem. was collected from herbal garden, Department of Dravyagunavijnanam, Government Ayurveda College, Tripunithura. Collected specimens were washed,

impurities removed and dried in indirect sunlight. It was made into small pieces, powdered and kept in air tight containers. The phytochemical analysis was done at Drug standardization unit of Department of Dravyaguna vijnanam, Government Ayurveda College, Tripunithura.



Fig 1. Leaf of *Indoneesiella echioides* (L.) Sreem



Fig 2. Flower and Fruit of *Indoneesiella echioides* (L.) Sreem

MATERIALS AND METHODS

All the procedures were done according to Ayurvedic Pharmacopeia of India as well as other reported methods [12-14]. The results are tabulated below.

RESULTS

Table 1: Results of physico-chemical parameters

S.No	Experiments	<i>Indoneesiella echioides</i> (L.) Sreem
1.	Foreign matter	Nil
2.	Total ash	6.77 %
3.	Acid insoluble Ash	1.23%
4.	Water soluble Ash	5.64%
5.	Moisture Content	9.55%
6.	Volatile oil	Nil
7.	Fiber	50.866%
8.	Tannin Content	3.187 %
9.	Total sugar	10.99%
10.	Reducing sugar	4.11%
11.	Phenol	27.979microgram/gram

Table 2: Results of extractive values

S.No	Type of Extractives	<i>Indoneesiella echioides</i> (L.) Sreem
1.	Cold alcohol soluble	3.56 %
2.	Hot alcohol soluble	5.5%
3.	Cold water soluble	12.98 %
4.	Hot water soluble	26.2%

Table 3: Results of successive solvent extraction

S.No	Solvent	Percentage of extractive values of <i>Indoneesiella echioides</i> (L.) Sreem
1.	Petroleum ether	3.18%
2.	Cyclohexane	3.26 %
3.	Acetone	1.71%
4.	Alcohol	8.32%

Table 4: Results of qualitative analysis of crude drug

Experiment	<i>Indoneesiella echioides</i> (L.) Sreem
1. Alkaloids	
a) Dragendroff's test	-
b) Meyer's test	+
c) Wagner's test	+
2. Flavonoids	+
3. Saponins	+
4. Carbohydrates	
a) Fehling's test	+

b) Benedict's test	+
5. Proteins	+
6. Phenols	
a) Ferric chloride test	+
b) Lead acetate test	-
7. Steroids	+
8. Tannins	
a) Ferric chloride test	+
b) Lead acetate test	-

Table 5: Results of qualitative analysis of extractives of *Indoneesiella echioides* (L.) Sreem

S.No	Extract	Steroids	Alkaloids	Flavonoids	Phenols
1.	Petroleum ether	+	+	+	+
2.	Cyclohexane	+	-	-	-
3.	Acetone	+	-	+	+
4.	Alcohol	-	-	-	+

Table 6: Results of qualitative analysis of ash of *Indoneesiella echioides* (L.) Sreem

S.No	Experiment	<i>Indoneesiella echioides</i> (L.) Sreem
Acid radicals		
1.	Carbonate	+
2.	Phosphate	+
3.	Chloride	-
4.	Sulphate	-
Basic radicals		
5.	Potassium	-

+ present, - absent

DISCUSSION

Comparing to the result obtained in a previous study done by Ramasubramania Raja *et al* (2014), using leaves alone there is a slight variation in physico-chemical parameters^[10]. In this study the analysis was done with the powder of whole plant. Difference in the values may be due to the inclusion of root, stem and fruits.

Table 7: Comparison of physico-chemical parameters of leaves and whole plant

Parameters	Leaves	Whole plant
Total ash	3%	6.77%
Acid insoluble ash	1.2%	1.23%
Moisture content	14.9%	9.55%
Crude fibre content	20%	50.866%

As reported by Anandanayaki and Uma (2014)^[11] using whole plant powder, the ash value, acid insoluble ash and moisture content were 34%, 17% and 46% respectively. The specimens used by them were collected from Karaikal region, Puducherry. The reason for the increased values may be due to the varied climatic conditions such as soil, temperature, humidity, rainfall, etc.

Among the extractive values, water soluble extractives exceeded the alcohol soluble extractives. This revalidates the usage of water based formulations in Ayurvedic science like *Swarasa* (juice), *Kalka* (paste), *Kwatha* (decoction), etc. As mentioned in Hortus Malabaricus, the drug is used in fresh juice or paste form. CRC World Dictionary of Medicinal and poisonous plants elaborates the application of the drug in similar formulations^[15].

Previous studies done in extracts of leaves^[7,11] and stem^[8] revealed the presence of alkaloids, flavonoids, saponins, carbohydrates, proteins, phenols, steroids and tannins. In the present study also these phytoconstituents were present. In Ayurveda, small herbs are to be used completely, if useful part is not mentioned. From the present study it is clear that the phytoconstituents present

in the extracts of leaves and stem are also present in the whole plant powder. Hence the corresponding pharmacological activities should be present in the whole plant powder also.

Successive solvent extraction with cyclohexane was done. In the qualitative analysis of the extract, steroids was found to be present. In the ash analysis, carbonates and phosphates were present.

CONCLUSION

Secondary metabolites which are limited in distribution to a specific taxonomic group are biosynthetically derived from primary metabolites. These are responsible for the medicinal properties of a drug. Through analysis of phytochemicals, the possible mode of action of the plant can be explained. From this study it is evident that the plant is having enormous potential for curing many human ailments. More research works are to be done to unveil the unrevealed pharmacological activities.

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