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Research Article

PHYSICOCHEMICAL AND PHYTOCHEMICAL EVALUATION OF *PATOLA* (*TRICHOSANTHES CUCUMERINA* VAR. *CUCUMERINA*)

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ABSTRACT

Introduction*: Patola* is an important plant drug used in many Ayurvedic medicinal preparations. The source plant of *Patola* is *Trichosanthes cucumerina var. cucumerina,* belonging to Cucurbitaceae family, found distributed (growing wild) throughout India especially in Bengal, Gujarat, Konkan, Deccan and Kerala. It is an extensively climbing annual herb with slightly downy or pubescent slender five angular –furrowed stems. It is found climbing over small trees, hedges and suitable supports. The present work is taken up with an objective to standardize *Patola* with detailed physical and preliminary phytochemical standards.

Methods*:* Samples of *Trichosanthes cucumerina var. cucumerina (Patola)* was collected from Thellakom, Kottayam district. The plant was properly identified and authenticated by Dept of Botany, University of Kerala. The sample was shade dried and stored in an air tight container. Physicochemical, phytochemical, chromatographic and heavy metal analysis was carried out as per ICMR procedures. **Result:** On physicochemical evaluation water soluble extractive value was 9.07± 0.012 and alcohol soluble extractive value was 18.72± 0.027. Heavy metals copper, cadmium, iron and lead levels were within normal limits. HPTLC was carried out with Toluene: Ethyl acetate: Formic acid as solvent system and 3 spots were obtained. **Conclusion:** The results obtained in this study may help in standardization, identification and further research in Trichosanthescucumerina var. cucumerina.

KEYWORDS: Patola, Trichosanthescucumerinavar.cucumerina, phytochemicals, HPTLC, AAS.

INTRODUCTION

Patola (Trichosanthes cucumerina var. cucumerina) is a drug widely used in the Ayurvedic pharmaceutical industry. The source plant of *Patola* is *Trichosanthes cucumerina var. cucumerina,* belonging to *Cucurbitaceae* family. The plant is found distributed (growing wild) throughout India especially in Bengal, Gujarat, Konkan, Deccan and Kerala. It is an extensively climbing annual herb with slightly downy or pubescent slender five angular – furrowed stems.[1] It is found climbing over small trees, hedges and suitable supports. *Patola* is mentioned in classical Ayurvedic texts both as diet and medicine. According to *Ashtanga hridaya* (an ancient classical literature) it is classified under *tikta skandha* (group of drugs having bitter taste). Based on its pharmacological property it is grouped in *patoladi gana.*[2] *Bhavamisra* quoted the leaf of *Patola* as pacicifying pitta, fruit pacifying tridoshas and the root as purgative.[3]

To date monograph of *Patola (T cucumerina var. cucumerina*) is not available in the Ayurveda Pharmacoepia of India. Setting up a standard of physicochemical and phytochemical characters of the plant will help in standardization, thereby promising quality and purity of the samples.

The objective of the present study is to evaluate the preliminary physicochemical and phyto-chemical characters of the drug.

MATERIALS AND METHODS

Sample collection- The sample drug *Patola (Trichosanthes cucumerina var. cucumerina)* was collected from *Thellakom, Kottayam* district and the sample was authenticated by Botanist, Dept of Botany, University of Kerala, Kerala. The voucher specimen is kept in the Herbarium of Dept of Botany, University of Kerala with Voucher no.KUBH 6188.

Fig 1: Collected samples of *Patola (Trichosanthes cucumerina var. cucumerina)*

Study settings

Drug Standardisation Unit, Govt. Ayurveda College Thiruvananthapuram, Kerala.

Preliminary physical and phytochemical evaluation

Preliminary physicochemical and phytochemical analysis of genuine sample of the study were conducted. Physicochemical analysis included the evaluation of parameters like foreign matter, moisture content, ash values, fibre content, volatile oil content, sugar content and different extractive values, were done. It also included the qualitative tests for the detection of phenols, steroids, alkaloids, flavonoids, tannins and glycosides.[4] The procedures were done as per procedures mentioned in ICMR[5] and Ayurvedic Pharmacopoeia of India.[6]

Heavy metal analysis by Atomic Absorption Spectroscopy and chromatographic techniques like TLC, HPTLC were also conducted.

RESULTS AND DISCUSSION

Results of preliminary physicochemical evaluation

The screening of physical and phytochemical parameters of *Trichosanthes cucumerina var. cucumerina* were done as per the standard procedures. Physical characters like moisture content, total ash, acid insoluble ash, water extractive and alcohol soluble extractives were analysed.

Table 1: Preliminary physicochemical analysis

SI No	Name of the experiment	*Tcucumerina var. cucumerina*
1	Foreign matter (%)	Nil
2	Moisture content (%)	0.9± 0.213
3	Volatile oil (%)	Nil
4	Total ash (%)	4.04± 0.121
5	Acid insoluble ash (%)	1.45±0.025
6	Water soluble extractive (%)	9.07± 0.012
7	Alcohol soluble extractive (%)	18.72± 0.027
8	Fibre content (%)	25.38± 1.24
9	Sugar content Reducing sugar (%) Total sugar (%)	 0.20±0.114 0.40 ± 0.160

Results of preliminary phytochemical evaluation

The ethanolic extractive obtained was subjected to qualitative analysis for identification of various plant constituents like steroids, phenols, alkaloids, flavonoids, tannins and results were summarized in Table No:2. The presence of various phytochemicals determines the pharmacological action and therapeutic potential of that plant. The preliminary phytochemical screening of heartwood showed the presence of different phytoconstituent groups such as steroid, flavonoid, saponin, alkaloid and tannin.

Table 2: The results of qualitative chemical evaluation of alcoholic extract

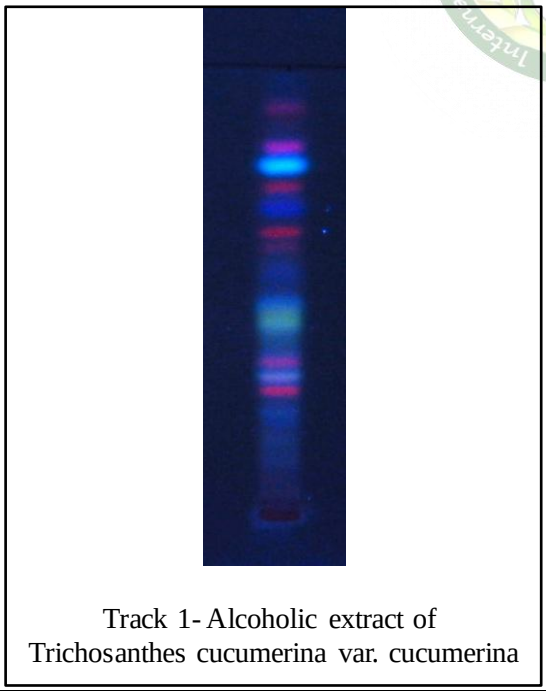
S.No	Chemical constituent	Ethanolic extract of *T cucmerina*
1	Steroid	+
2	Flavonoid	++
3	Phenol	++
4	Alkaloid	+
5	Tannin	++
6	Saponin	+

Results of TLC and HPTLC

The spots obtained in TLC gives an idea about the plant constituents. The best separation was achieved using Toluene: Ethyl acetate: Formic acid in the ratio 6:3:1. The plates were first viewed through UV-fluorescence viewing cabinet (365nm) and the Rf values of the spots were noted (Table No: 4). HPTLC was done and the HPTLC profile was shown in figure 2 and its 3D scan profile was shown in figure 3.

Table 3: Rf values of spots obtained in Chromatography

Solvent system with ratio	Sample	No of spots	Rf value
Toluene: Ethyl acetate: Formic acid. 6:3:1	Ethanolic extract of *Acacia catechu*	3	0.88 0.76 0.12



Track 1- Alcoholic extract of Trichosanthes cucumerina var. cucumerina

Figure 2: HPTLC of *T cucumerina* with solvent system Toluene: Ethyl acetate: Formic acid 6:3:1

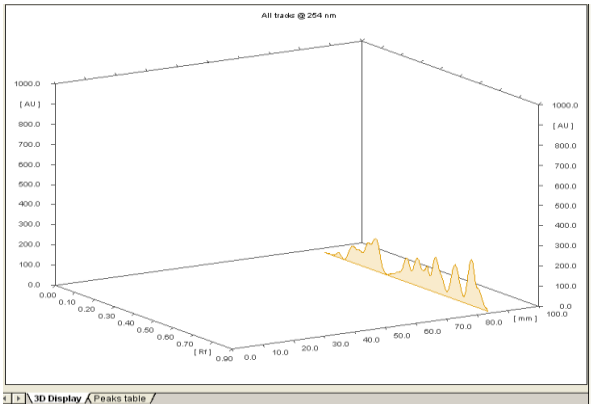


Figure 3: 3D scan profile of HPTLC of *T cucumerina*with solvent system Toluene: Ethyl acetate: Formic acid 6:3:1 at 254nm

Results of Atomic Absorption Spectroscopy

Atomic absorption spectroscopy is used in the determination of heavy metal elements and some non-metal elements in atomic state and the results are shown in Table No: 4. Four heavy metals- copper, cadmium, iron and lead contents were analysed and found within permissible limits. Hence the drug is not contaminated by heavy metals and can be used safely for internal administration.

Table 4: Atomic absorption spectroscopy

Samples	Heavy metal concentration (in ppm)			
	Cu	Cd	Fe	Pb
Whole plant of T cucumerina	0.1865± 0.002	0.0680± 0.004	25.931± 0.013	0.0672± 0.043

CONCLUSION

Preliminary phytochemical evaluation of *T cucumerina* was done according to the ICMR procedures. On physico chemical analysis the plant was found with alcohol soluble extractive value higher than water soluble extractive value (18.72 ± 0.027% and 9.07± 0.012% respectively). The total ash value was 4.04 ± 0.121%. It showed high fibre content (25.38±1.24%) The preliminary phyto-chemical screening showed the presence of different phytoconstituent groups such as flavonoids, saponins, alkaloids and tannins. AAS evidenced that the drug is not contaminated by heavy metals and can be used safely for internal administration. Here the observations and results obtained are useful for further pharmacological and therapeutically evaluation.

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