



AkiNik

ISSN 2278-4136

ISSN 2349-8234

JPP 2013; 2 (3): 62-65

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Received: 7-8-2013

Accepted: 18-8-2013

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Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

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Preliminary Phytochemical Evaluation of Seed Extracts of *Cucurbita maxima* Duchesne

Ashok Sharma*, Ashish K. Sharma, Tara Chand, Manoj Khardiya, Kailash Chand Yadav

ABSTRACT

Cucurbita maxima Duchesne (family: Cucurbitaceae) is a trailing annual herb, widely cultivated throughout India and in most warm regions of the world, for use as vegetables as well as medicines. The present study deals with preliminary physicochemical and phytochemical evaluation of seed extract of *Cucurbita maxima*. The study includes preparation of different extracts by successive solvent extraction for detailed analysis. Different physicochemical parameters such as ash value (total ash, acid insoluble ash and water soluble ash value), loss on drying, alcohol soluble and water soluble extractive value, percentage yield of successive solvent extracts and phytochemical evaluation of different extracts of *Cucurbita maxima* were carried out as per standard recommended physicochemical determinations and authentic phytochemical procedures. Preliminary phytochemical evaluation on different extracts of seed of *Cucurbita maxima* reveals the presence of proteins, carbohydrates, flavonoids, saponins and tannins.

Keywords: *Cucurbita maxima* Duchesne, Seed, Physicochemical, Phytochemical and Successive solvent extraction.

1. Introduction

Cucurbita maxima Duchesne belongs to family Cucurbitaceae commonly known as “Pitakusmandah” in Sanskrit; “Kaddu” or “Sitaphal” in Hindi and “Squash” or “Red guard pumpkin” in English, has been claimed in traditional literature to be valuable against a wide variety of diseases. It is a trailing annual herb with somewhat prickly or hairy stem and axillary tendrils, leaves simple, alternate; flowers large, yellow, unisexual, solitary; fruits fleshy, round or oval, brown; seeds ovoid or oblong, compressed [1,2,3]. It is widely cultivated throughout India and in most warm regions of the world, for use as vegetable as well as medicine. Both of its fruits and the aerial parts are commonly consumed as vegetable [2]. The fruits are sweet, refrigerant, emollient, diuretic, sedative and tonic and are useful in burns, scalds, inflammations, abscesses, boils, migraine and neuralgia [1]. Fruit pulp is used as poultice and supplied on to burns, boils and inflammations [2,3]. The seeds used as anthelmintic, diuretic and nervine tonic and are useful in taeniasis, strangury and nervous debility. Seeds also used as abortifacient and insecticidal [1, 2, 3]. This plant has been traditionally used in many countries such as India, China, Brazil, Yugoslavia and America as antidiabetic and antihyperlipidemic [5], antitumor, antihypertensive, anti-inflammatory, immunomodulatory and antibacterial agents [1, 2, 3, 6, 7, 8].

It contains moisture, lipids, protein and ash. Non-polar lipids, glycosides and phospholipids. The major fatty acid present in the lipids was linolenic [1].

Popularity of *Cucurbita maxima* (pumpkin) in various traditional system of medicine for several ailments focused the investigator’s attention on this plant.

The present study is designed to explore the preliminary physicochemical and phytochemical evaluation of *Cucurbita maxima* seeds, which is responsible for its pharmacological activities.

2. Material and Methods

2.1 Plant Material

The seeds of *Cucurbita maxima* were collected from local market of Jaipur city and were identified and authenticated by the Herbarium Department of Botany, University of Rajasthan, Jaipur (Rajasthan), India. A voucher specimen (No. RUBL-20941) were kept in the herbarium department for future reference.

2.2 Physicochemical Evaluation

2.2.1 Determination of Ash Value^[9,10,11]

The residue remaining/left after incineration of the crude drug is designated as ash. The ash

remaining following the ignition of medicinal plants is determined by three different methods which measures, total ash, acid-insoluble and water soluble ash. The total ash value of plant material indicated the amount of earthy material or inorganic composition and other inorganic composition and other impurities present along with the drug.

2.2.2 Determination of Loss on drying (Moisture Content) [10, 11]

2 gm. of powdered drug was weighed accurately in porcelain dish and heated for 105 °C in hot air oven. Cooled and the difference in the weight was calculated as moisture.

2.2.3 Determination of Extractive Value [9, 10, 12]

Extractive values are useful to evaluate the nature of constituents present in the crude drug. Water soluble extractive and alcohol soluble extractive values were calculated as per standard procedures.

2.3 Phytochemical Evaluation

2.3.1 Extraction of Plant material

The seeds were cleaned well with water and dried in a shadow place. After complete drying, the seeds were powdered and passed through sieve no. 40 and were extracted by using soxhlet apparatus, successively with petroleum ether (60-80 °C), ethyl acetate and alcohol. Each time before extracting with next solvent the powdered material was dried in hot air oven below 50 °C. Each extract was then concentrated by distilling off the solvent by evaporation to dryness on a water bath. All the extracts were stored at 4 °C for qualitative analysis and pharmacological studies.

2.3.2 Preliminary Phytochemical screening

The freshly prepared extracts (petroleum ether, ethyl acetate and alcohol) for the presence of different constituents using standard methods [9, 12, 13, 14, 15]. The phytochemical screening gave positive tests for carbohydrates, flavonoids, tannins, phenolic and saponins etc.

3. Results and Discussion

All the results generated from the present study are represented in respective tables. The powdered seeds of *Cucurbita maxima* was subjected to physicochemical and preliminary phytochemical evaluation which were found to be very promising.

The physicochemical parameters of seeds of *Cucurbita maxima* are

tabulated in Table-1. The percentage of total ash, acid insoluble ash and water soluble ash are carried out and results are tabulated in Table-1. The determination of ash value was carried out which gives an idea of the earthy material or inorganic composition and other impurities present along with the drug. The analytical results showed that total ash value, acid insoluble and water soluble ash values were 3.121, 0.279 and 0.689% W/W respectively observed. The deterioration time of the plant material depends upon the amount of water present in plant material. If the water content is high, the plant can be easily deteriorated due to contamination by fungal colonies. The loss on drying at 105 °C in seed was found to be 7.995% W/W.

Extractive values were determined which are primarily useful for the determination of exhausted or adulterated drugs. The water soluble and alcohol soluble extractive values were also determined. The water soluble extractive value was indicating the presence of polar sugar, acid and inorganic compounds and the alcohol soluble extractive value indicating the presence of polar constituents like phenols, steroids, glycosides and flavonoids. The water soluble and alcohol soluble extractive value of seeds of *Cucurbita maxima* were 15.8 and 9.2% respectively and are represented in the Table-1.

The preliminary phytoprofiling for the seeds extracts of *Cucurbita maxima* was carried out where in the consistency was found to be sticky in the non-polar to not so polar solvent extracts where as the polar solvent extracts where as the polar solvent extracts were found to be non-sticky. The percentage yield W/W of the different extracts were also analysed where in the highest yield was found to be in the alcohol extract i.e. 9.84% (Table-2).

The preliminary phytochemical results showed the presence and absence of certain phytochemicals in the extracts. The test was performed using different organic solvents: petroleum ether, ethyl acetate and alcohol extracts respectively. The preliminary phytochemical screening revealed the presence of proteins, phenolics, tannins and fixed oils in the petroleum ether (60-80 °C) extract. The ethyl acetate extract contains carbohydrates, proteins, phenolics and tannins. The alcoholic extract contains carbohydrates, proteins, phenolics, tannins, flavonoids and saponins which could make the plant useful for treating different ailments as having a potential of providing useful drugs for human use (Table-3).

Table 1: Physicochemical parameters of powdered seeds of *Cucurbita maxima*

S No.	Parameters	% W/W*
1.	Ash values	
	Total ash	3.121
	Acid insoluble ash	0.279
	Water soluble ash	0.689
2.	Loss on drying	7.995
3.	Water soluble extractive value	15.8
4.	Alcohol soluble extractive value	9.2

* mean of triplicate

Table 2: Extraction values of seeds extracts of *Cucurbita maxima*

S. No.	Solvent extracts	Colour	Consistency	Yield (%W/W)
1.	Petroleum ether extract	Cream-Yellow	Semi-solid with sticky	7.80%
2.	Ethyl acetate extract	Cream-White	Non sticky	8.62%
3.	Alcohol extract	Cream-White	Non sticky	9.84%

Table 3: Preliminary phytochemical screening of powdered seed extracts of *Cucurbita maxima*

S. No.	Chemical Category	Name of test	PE	EAE	AE
1.	Carbohydrates	Molisch's test	-	+	+
		Bial's test	-	+	+
2.	Proteins & Amino acids	Biuret test	+	+	+
		Xanthoprotein test	-	-	-
		Millon's reagent test	-	-	-
3.	Alkaloids	Dragendorff's test	-	-	-
		Mayer's test	-	-	-
		Hager's test	-	-	-
		Wagner's test	-	-	-
		Tannic acid	-	-	-
4.	Glycosides	General test	-	-	-
		Bornträger's test	-	-	-
		Cardiac Glycosides	-	-	-
		Coumarin Glycosides	-	-	-
5.	Phenolics/Tannins	Ferric chloride test	-	-	+
		Drug + lead acetate + water	+	+	+
		Potassium dichromate	+	+	+
6.	Flavonoids	Shinoda's test	-	-	+
		NaOH	-	-	-
7.	Saponins	Drug + water + shaking	-	-	+
8.	Fixed oils & Fats	Spot test	+	-	-
9.	Steroids	Liebermann-Burchard test	-	-	-

Key: + = Present; - = Absent;

PE=Petroleum ether extract; EAE = Ethyl acetate extract, AE = Alcoholic extract;

4. Conclusion

In the present study, physicochemical and preliminary phytochemical evaluation of seeds of *Cucurbita maxima* Duchesne provide valuable information regarding their identification, authentication and chemical constituents which may be useful for the standardization and preparation of medicinal plants. The constituents of seeds of *Cucurbita maxima* may have several medicinal properties and can be utilized for the treatment of various diseases. Further research on this species may help in the isolation of therapeutically potent compounds which can be finally be subjected to pharmacological activities, thus leading to opening up new avenues in the use of natural products for therapeutic purpose.

5. Acknowledgement

The authors are highly thankful to Mr Ashish Kumar Sharma, HOD Pharmacology, Jayoti Vidyapeeth Women University, Jaipur, Rajasthan for their constant help and support.

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