Physico-chemical Standardization of Kanduri Root (*Coccinia cordifolia* Linn.)

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Abstract

Kanduri (*Coccinia cordifolia* Linn.) (root) is one of the important herbs mentioned in Unani literatures. Hkm Azam Khan (1893AD) has described it for the treatment of renal diseases whereas Hkm Najmul Ghani (2011 AD) has mentioned its efficacy in kasrat-e-baul (polyuria) along with other diseases. In present study, an attempt is being made to work on standardization and quality assurance of Kanduri root. Various parameters have been used to ensure its quality. These parameters include Ash value (total ash, acid insoluble ash, water soluble ash), Extractive values (successive), Solubility in alcohol and water, Loss on drying, pH at 1% & 10%, Bulk density. Qualitative tests have also been used to determine the presence of phytochemicals in the drug studied.

Keywords: Kanduri *(Coccinia cordifolia* Linn.), Standardization, Ash value and Physicochemical.

Introduction

Kanduri (*Coccinia cordifolia* Linn.) belongs to the family Cucurbitaceae, is a perennial creeping herb with long tapering tuberous roots and deep green leaves (Fig. 1 & 2). It grows in a wild state abundantly in Bengal and in most parts of India, Tropical Africa, Australia, Fiji and throughtout the oriental countries (Khatoon *et al*., 2012). It has a smooth green fleshy fruit with an extremely bitter taste, when ripe the fruit becomes scarlet in colour and sweet to the taste and is occasionally eaten as a vegetable (Ghani, 2010). The plant has the reputation in Bengal of having a remarkable effect in reducing the amount of sugar in the urine of patient suffering from Diabetes mellitus(Chopra, 1958; Anonymus, 2001). The plant has also been used extensively in Ayurvedic and Unani practice. It is one of the constituents of many pharmacopoeial preparations. Though the entire plant has medicinal value however, its roots and leaves are more commonly used as theraputic agent in different pathological conditions. However, inspite of being used commonly by the physicians of traditional medicine in Indian subcontinent and other countries, this plant has not been standardized so far. In view of the above, the present study has been undertaken to determine its physicochemical and some of the qualitative standards.

Material and Method

The raw material was collected from Naqwi Park, Aligarh besides Ajmal Khan Tibbiya College Hospital in the month of March and the sample was authenticated

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Fig. 1: Plant of Kanduri (*Coccinia cordifolia*)

Fig. 2: Roots of Kanduri (*C. cordifolia*)

in Pharmacognosy section of department of Ilmul Advia, Faculty of Unani Medicine, AMU, Aligarh. Voucher specimen was preserved in the herbarium of department (Voucher No. SC-0168/15) for future reference

Chemical Parameters: First the organoleptic characters were studied. The dried powder of Kanduri roots was used for chemical analysis. Various physico-chemicals studies including total ash, acid insoluble ash, water soluble ash, alcohol and water soluble matter, moisture content, successive extractive values using soxhlet extraction method, bulk density and pH studies were carried out as per guidelines of WHO (Anonymus, 1998). Qualitative analysis of the drug was conducted to identify the organic chemical constituents present in the drug (Overtone, 1963; Harbrne, 1973).

The Thin Layer Chromatographic analysis was conducted according to the method of Stahl (1969) and Harborne (1973) on precoated silica gel 60F $_{254}$ TLC plates. The plates were visualised in day light, UV Short and UV Long and they were also derivatised using iodine vapour.

Observations and Results

(a) Organoleptic characters: The organoleptic characters of powder of the root of Kanduri are depicted in Table 1.

Table 1: Organoleptic Characters of *Coccinia cordifolia* root

S.No.	Organoleptic characters	
1.	Colour	Light brown
2.	Appearance	Powder
3.	Texture	Coarse
4.	Taste	Astringent
5.	Smell	Agreeable

(b) Physicochemical constants: The analytical values of different physicochemical constants have been described in Table 2.

(c) Qualitative analysis of organic chemical constituents of drug: The phytochemicals present in the drug were identified on the basis of different chemical tests done for various plant constituents (Table 3).

(d) FTAR Analysis: Fluorescence analysis of successive extract was studied under day light as well as Ultra Violet (Short and long wave length) light; results have been summarized in Table-4. FTAR analysis of the powder drug was also done after allowing it to react with various chemical reagents (Table 5).

Table 2: Physicochemical study of powder of Kanduri root

S.No.	Parameters	Percentage (w/w)
1.	Ash value	
	Total ash	9.78
	Acid insoluble ash	1.48
	Water soluble ash	7.95
2	Soluble Part	
	Ethanol soluble	6.10
	Aqueous soluble	20.7
3	Successive Extractive Values	
	Pet. Ether	0.48
	Di-ethyl ether	0.18
	Chloroform	0.33
	Acetone	0.51
	Alcohol	2.82
	Aqueous	9.12
4	Moisture Content	15
5	Loss on Drying	8.5
6	pH Value	
	1% water solution	7.19
	10% water solution	6.49
7	Bulk density	0.66

*Note: Values are average of five experiments.

Table 3: Preliminary screening of major phytochemicals

S.No.	Chemical Constituent	Tests/Reagent	Inference
1	Alkaloids	Dragendrorff's reagent Wagner's reagent Mayer's reagent	+ + –
2	Carbohydrate	Molisch's Test Fehling's Test Benedict Test	+ + +
3	Glycosides	NaOH Test	+
4	Flavonoids	Mg ribbon Dil. Hcl	+
5	Tannins/Phenols	Ferric Chloride Test Liebermann's Test Lead Acetate Test	– – –
6	Proteins	Xanthoprotein Test Biurate Test	– –
7	Starch	Iodine Test	–
8	Saponins	Frothing With $NaHCO_3$	+
9	Steroid/Terpenes	Salkowski Reaction	+
10	Amino Acid	Ninhydrin Solution	–
11	Resin	Acetic Anhydride Test	–

Indications: '_' Absence and '+' presence of constituent.

Table 4: FTAR analysis of Kanduri Extract

S.No.	Extract	Day Light	UV Long	UV Short
1	Pet. Ether	Transparent	Dark Blue	Transparent
2.	Di- Ether	Transparent	Bluish	Light Green
3	Chloroform	Light Green	Light Blue	Transparent
4	Acetone	Grey	Violet	Greenish
5	Alcohol	Yellowish Brown	Black	Muddy Green
6	Aqueous	Dark Brown	Light Green	Greenish Brown

(e) Thin layer chromatographic profile: Thin layer chromatographic analysis of successive extract was carried out using different solvent systems and visualizing agents and R_f values were calculated. The findings have been summarized in Table 6 and Fig. 3 & 4.

Table 5: Fluorescence analysis of Kanduri with different chemical reagent

S.No.	Powder drug + Chemical Reagent	Day light	UV Short	UV Long
1.	Powdered drug + Conc. HNO_3	Brown	Dark Green	Black
2.	Powdered drug + Conc.Hcl	Grey	Dark Green	Black
3.	Powdered drug + Conc.H_2SO_4	Brown	Green	Redish Black
4.	Powdered drug + 2 % Iodine solution	Red	Green	Black
5.	Powdered drug + Galcial Acetic Acid +HNO_3	Brown	Light green	Green
6.	Powdered drug + Galcial Acetic Acid	Pale	Brown	Black
7.	Powdered drug +NaOH (10%)	Light Brown	Green	Light Green
8.	Powdered drug + Dil. HNO_3	Brown	Green	Green
9.	Powdered drug + Dil. H_2SO_4	Brown	Green	Black
10.	Powdered drug +Dil. Hcl	Light Brown	Green	Cherry Red
11.	Powdered drug + Dragendorff's	Greenish. B	Dark Green	Black
12.	Powdered drug + Wagner's Reagent	Grey	Green	Black
13.	Powdered drug + Benedict' Reagent	Whitish Green	Light Grey	Grey
14.	Powdered drug + Fehling Reagent	Brown	Light Green	Green
15.	Powdered drug + KOH(10%) Methno	Dark Brown	Light Green	Brown
16.	Powdered drug + $CuSO_4$ (5%)	Whitish Brown	Green	Cherry Red
17.	Powdered drug +Ninhydrin (2%) in Acetone	Brown	Green	Grey
18.	Powdered drug + Picric Acid	Yellow	Green	Black
19.	Powdered drug + Lead Acetate (5%)	White	Light Green	Dark Brown

Table 6: Thin Layer Chromatography Profile

Treatment	Mobile Phase	No of Spots	R_f Value and colour spots
Petroleum Ether Extract			
Iodine Vapour	Petroleum ether: Di-ethyl ether (2:1)	4	0.33 (yellow Brown,
			0.38 (Mustard Yellow),
			0.55 (Light Yellow),
			0.61 (Light Yellow),
UV Long		4	0.33 (Sky Blue), 0.44 (Blue),
			0.57 (Dark Blue), 0.65 (Dark Blue)
Di-ethyl Ether Extract			
Iodine Vapour	Petroleum ether: Di-ether ether (2:1)	1	0.12 (Yellow)
Chloroform Extract			
Iodine Vapour	Chloroform: Methanol (1:1)	3	0.22 (Yellow. Brown)
			0.62 (Mustard Yellow)
			0.85 (Light Yellow)
UV Short		3	0.22 (Yellow), 0.62 (Bluish),
			0.85 (Light Brown
UV Long		5	0.22 (Dark Blue), 0.30 (Dark Blue)
			0.33 (Blue), 0.62 (Sky Blue)
			0.85 (Sky Blue
Alcoholic Extract			
Day Light	Butanol: Acetic acid: Water (5: 1: 4)	2	0.33 (Dark Brown), 0.85 (Brown)
UV Long		2	0.33 (Sky Blue), 0.85 (Whitish Blue)
UV Short		3	0.30 (Green), 0.53 (Green), 0.84 (Green)
Iodine Vapour		2	0.26 (Yellow), 0.80 (Brown)
Aqueous Extract			
Day Light	Butanol: Acetic acid: Water (5: 1: 4)	1	0.30 (Light Brown)
UV Long		2	0.30 (Sky Blue), 0.92 (Sky Blue)
UV Short		2	0.30 (Green), 0.92 (Greenish Blue)
Iodine Vapour		2	0.30 (Brown), 0.92 (Yellow)

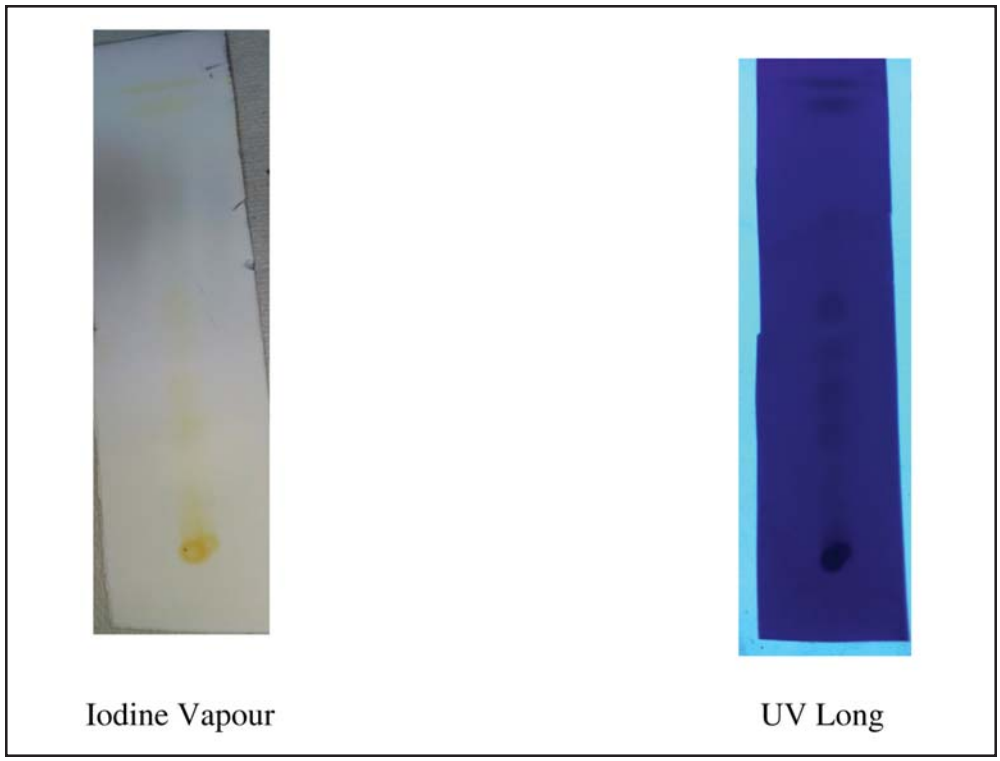

Fig. 3: TLC Profile of Petroleum ether extract of Kanduri Root
Petroleum ether: Diethylether:2:1

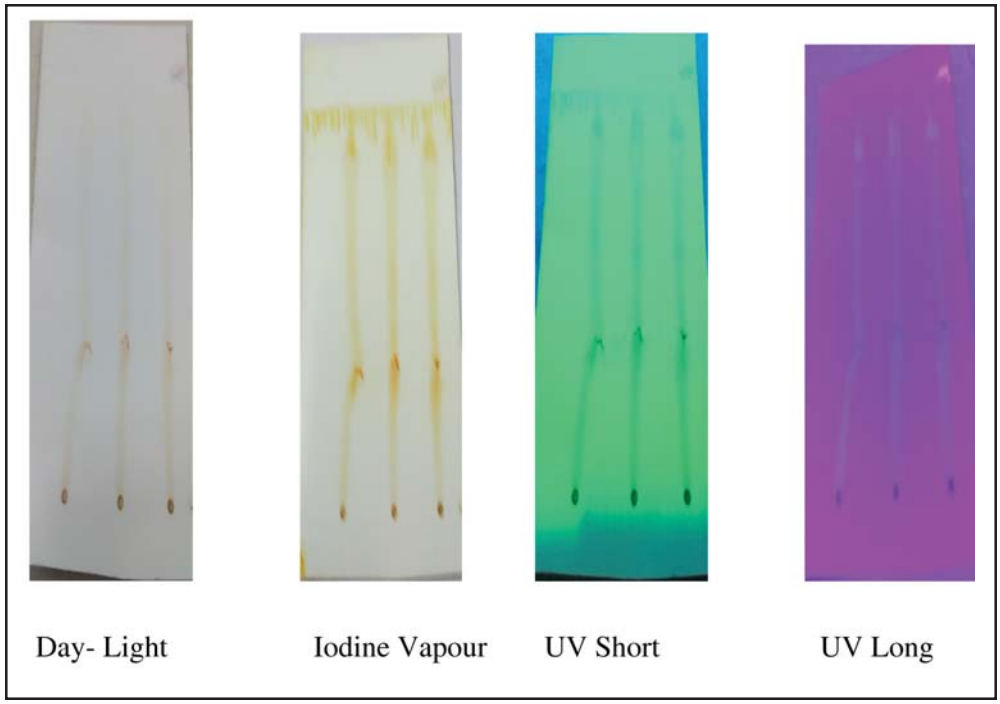

Fig. 4: TLC Profile of Alcohlic extract of Kanduri Root
Butanol: Acetic acid: Water; (5:1:4)

Discussion

Since the efficacy of a drug depends mainly upon its physical and chemical properties therefore, the determination of physicochemical characters is considered mandatory so as to ensure the authenticity of a drug. It also helps in determining the dose response relationship and thereby maximizing the therapeutic utility. Following parameters were used for the physicochemical study of Kanduri.

For establishing the standards of a drug the extractive values play an important role, as the adulterated or exhausted drug material will give different values rather than the extractive percentage of the genuine sample (Jenkins *et al*., 1967).Percentage of solubility is also considered as an index of purity, as alcohol can dissolve almost all substances including glycosides, resins, alkaloids etc.The ash value determination furnishes the basis of judging the identity and cleanliness of a drug and give information related to its adulteration with inorganic matter (Jenkins *et al.,* 1967).The moisture content of the drug is variable because mostly herbal drugs are hygroscopic and excessive moisture content becomes an ideal medium for the growth of different type of micro-organisms like bacteria and fungi they subsequently spoil the purity of drug.The pH provides a useful practical means for the quantitative indication of the acidity and alkalinity of a solution (Anonymous, 1968).Qualitative phytochemical analysis of Kanduri was also carried out for the determination of the presence of alkaloids, flavonoids, glycosides, tannins, phenols, resins, sterols/terpenes, sugars, starch, amino acid, proteins and saponins. The therapeutic properties of the crude drugs are mainly due to physiologically active chemical constituents present in the drugs, and the lower percentage of chemical constituents may cause lesser therapeutic value. Thin layer chromatography is one of the important parameters used to detect the adulteration for judging the quality of drugs. The resolution of different kinds of chemical components are separated by using TLC and calculating the R_f values after detecting the spots in order to standardize the drug for its identity, purity and strength. The exhausted or deteriorated drugs may lose the components and the number of spots appeared might be less. Keeping this in mind TLC studies of different extracts obtained in different organic solvents of the test drug have been conducted, and $R_f$values of various spots appeared in different solvents system have been noted.

Physicochemical study helps in characterization of constituents or groups of constituents that frequently lead to establish the structure-activity relationship and the likely mechanism of action of the drug. Physicochemical constituents present in the drug vary, not only from plant to plant but also among different samples of same species, depending upon various atmospheric factors, storage and

drying conditions. A little deviation from the normal in terms of quality and quantity of the constituents may alter the effect of the drug. Apart from the degradation in the quality of the drugs that occurs due to above conditions, adulteration also contributes to variability. The findings of the study may be used to set the physicochemical standards of a genuine sample of 'Kanduri.

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