Development of Standards of Sapistan (*Cordia dichotoma* Forst.f.)

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Abstract

Physicochemical and Phytochemical standardization is considered a pre-requisite for the assessment of biological activity or determination of biological standards of the plant material. It provides the analytical characteristics which may prove to be useful in fixing the physicochemical standard for the Unani herbal drugs.

Sapistan (*Cordia dichotoma*) belongs to the family Ehretiaceae; its fruits and leaves are used in respiratory diseases such as asthma, cough, diphtheria, pneumonia, sore-throat, coryza. An effort has been made to carry out the physicochemical and phytochemical studies of plant. Physicochemical parameters as Extractive Values: Petroleum Ether (1.9%), Di-ethyl ether (0.85%), Chloroform (0.59%), Acetone (0.12%), Alcoholic (6.13%), Aqueous (10.44%); Solubility: Water (9.44 %) & Alcohol (1.16 %); Moisture contents (3.45 %), Total Ash values (7.188%), pH of 1% (6.76) & 10% solution (6.16) and loss on drying (5.3%). Phytochemical analysis: These revealed the presence of almost all the phyto-constituents in the test drug sample i.e. alkaloid, flavonoids, glycoside, carbohydrate, tannin, protein, amino acids, starch and resins.

Keywords: Sapistan, Physicochemical, Phytochemical, Standardization, *Cordia dichotoma* Forst.f.

Introduction

Sapistan (*Cordia dichotoma* Forst.f.) belongs to the family Ehretiaceae (Anonymous, 2006). Use of the drug 'Sapistan' in Unani system of medicine dates back about a couple of thousands of years. It is mentioned by Theophrastus and was not disregarded through the Arabic, Persian and Urdu authors in their books. It was particularly mentioned by Razi (926 A.D.) Ibne Sina (1037 A.D.) Al- Harwi (10th C.A.D). Sebestan or Sapistan is an abbreviation of sag pistan, derived from sag, adog and pistan dugs. The fruit resembles bitches dugs in shape. Sapistan is used for cure of the respiratory diseases (Khory and Katrak, 1984).

Sapistan is a fruit of tree. The tree is of two types, one type of tree have a large fruits known as 'Rai Gond'. And the other tree having small fruit called 'Kath Gond'. This tree consists of many branches which are pale red in colour. Flowers are found in clusters form. Fruit get ripened in the month of May to July (Ghani, 2011).

Medicinally, the dried fruit is valued on account of its mucilaginous nature and demulcent properties; it is much used in coughs and chest affections, also in

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irritation of the urinary passages; in larger quantities it is given in bilious affections as a laxative. Mahometan writers describe two kinds of Sapistan; the greater, the pulp of which is separable from the stone, and the lesser, the pulp of which is adherent.

Botany- brief description:

A middle-sized deciduous tree and usually with a crooked trunk. Bark grey, rough with shallow longitudinal furrows. Leaves thinly coriaceous, variable in shape and size, orbicular, ovate-elliptic. Flowers white, fragrant. Drupes ovoid, apiculate, pink or orange to reddish when ripe, filled with a viscid pulp; stone usually 1. Common in deciduous forests, flowers – March and April; fruits – May to July.

Therapeutic action and uses :

Fruits-astringent, anthelmintic, diuretic, demulcent, expectorant. Used in affection of urinary passages, diseases of the lung and spleen. Bark – used in dyspepsia and fever. Pulp – used in ringworm. Leaves – used in ulcer, headache (Ambasta, 1986; Chopra *et al.*, 1956; Kirtikar and Basu, 1996; Nadkarni, 1989).

No work appears to have been reported regarding standardization of this drug so far. Keeping in mind the medicinal importance of this plant in Indian Systems of Medicine, a physico-chemical and phytochemical study of this drug was carried out in order to fix-up its pharmacopoeial standards.

Material and Method

Collection of plant material: The drug samples of Sapistan (fruits) were collected from Bara Duwari market of Aligarh city and were identified. Voucher specimens were preserved in the herbarium of Medicinal Plants Lab in the Department of Ilmul Advia, F/O Unani Medicine, Aligarh Muslim University, Aligarh (Voucher No. SC-0141/14).

Chemical parameters: First, the organoleptic characters were studied. The dried powder of the fruits of Sapistan was used for chemical analysis. Various physico-chemical studies like 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 (Anonymous, 1998, 2008). Qualitative analysis of the drug was conducted to identify the organic chemical constituents present in the drug (Overtone, 1963; Harborne, 1973).

The thin layer chromatographic analysis was conducted following Stahl (1969) and Harborne (1973) on precoated silica gel $60F_{254}$ TLC plates. The plates were

visualized in day light, in short UV and Long UV. They were also derivatised using iodine vapors.

Observations

(a) Organoleptic characters: The powder of the fruits of Sapistan was brown with fruity smell any characteristic odour (Table 1).

(b) Physico-chemical constants: The analytical values of different physico-chemical constants were determined (Table 2).

Table 1: Organoleptic Characters of *Cordia dichotoma* Forst.f.

S.No.	Organoleptic parameters	Observations
1.	Colour	Brwon
2.	Smell	Fruity
3.	Taste	Disagreeable

Table 2: Physicochemical study of Powder of Sapistan

S.No.	Parameters	Percentage (w/w)*
1	**Ash value**	
	Total ash	7.188
	Acid insoluble ash	1.22
	Water soluble ash	5.92
2	**Soluble Part**	
	Ethanol soluble	1.66
	Aqueous soluble	9.44
3	**Successive Extractive Values**	
	Pet. Ether	1.72
	Di-ethyl ether	0.85
	Chloroform	0.59
	Acetone	0.12
	Alcohol	6.13
	Aqueous	10.44
4	**Moisture content**	3.45
5	**Loss on Drying**	5.3
6	**pH values**	
	1% water solution	6.76
	10% water solution	6.16
7	**Bulk density**	0.67

*Note: Values are average of three experiments.

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

(d) FTAR Analysis: Fluorescence analysis of the 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 was also done of the powdered drug after reacting them with various chemical reagents (Table 4).

Table 3: Preliminary Screening of major Phyto-chemicals

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

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

Table 4: FTAR Analysis of Sapistan

S.No.	Extract	Day Light	UV Long	UV Short
1.	Pet. Ether	Brown	Black	Greenish
2.	Di-ethyl ether	Greenish	Bluish	Greenish
3.	Chloroform	Light Green	Black	Light Green
4.	Acetone	Brown	Bluish	Greenish
5.	Alcohol	Brown	Black	Dark Brown
6.	Aqueous	Brown	Black	Black

(e) Thin layer chromatographic profile: Thin layer chromatographic analysis of successive extracts was carried out using different solvent systems and visualizing agents and R_f values were calculated to standardize the drug for its identity and purity (Table 5).

Table 5: Fluorescence Analysis of Sapistan with different chemical reagents

S. No.	Powdered drug + Chemical Reagent	Day light	UV short	UV long
1.	Powdered drug + Conc. HNO_3	Golden	Light Green	Green
2.	Powdered drug + Conc. Hcl	Brown	Light Green	Dark Green
3.	Powdered drug + Conc. H_2SO_4	Dark Brown	Dark Green	Black
4.	Powdered drug + 2% Iodine solution	Brown	Green	Black
5.	Powdered drug + Glacial Acetic acid + HNO_3	Light Brown	Light Green	Dark Green
6.	Powdered drug + Glacial acetic acid	Pale	Light Green	Black
7.	Powdered drug + NaOH(10%)	Brown	Light Green	Dark Green
8.	Powdered drug + Dil. HNO_3	Brown	Green	Green
9.	Powdered drug + Dil. H_2SO_4	Brown	Green	Dark Green
10.	Powdered drug +Dil. Hcl	Light Brown	Light Green	Black
11.	Powdered drug + Dragendorff's	Dark Brown	Bright Green	Green
12.	Powdered drug + Wagner's Reagent	Brown	Green	Dark Green
13	Powdered drug + Benedict's reagent	Blackish	Light Green	Black
14	Powdered drug + Fehling reagent	Brown	Light Green	Green
15	Powdered drug + KOH (10%) Methanolic	Brown	Green	Black
16	Powdered drug + $CuSO_4$ (5%)	Brown	Light Green	Black
17	Powdered drug + Ninhydrin (2%) in Acetone	Brown	Green	Black
18	Powdered drug + Picric Acid	Yellow	Bright Green	Black
19	Powdered drug + Lead Acetate (5%)	Brown	Light Green	Black

Table 6: Thin Layer Chromatography

Treatment	Mobile phase:	No of spots	Rf value and colour of spots
Petroleum Ether Extract			
Day Light	Petroleum ether : Di-ethyl ether (4:1)	1	0.42 (Brown)
UV Short		1	0.42 (Bluish)
Iodine Vapour		1	0.42 (Yellowish)
Aqueous Extract			
Day Light	Butanol: Acetic acid: Water (5:1:4)	1	0.75 (Brown)
UV Short		3	0.64 (Bluish), 0.78 (White), 0.85 (White)
UV Long		4	0.21 (white), 0.42 (white), 0.78 (white), 0.85 (white)
Iodine Vapour		1	0.75 (Pale Yellow)
Alcoholic Extract			
Day Light	Chloroform: Methanol (9:1)	1	0.62 (Pale yellow)
UV Short		2	0.62 (Purple) , 0.75 (Purple)
UV Long		2	0.62 (white), 0.75 (White)
Iodine Vapour		1	0.62 (Pale Yellow)

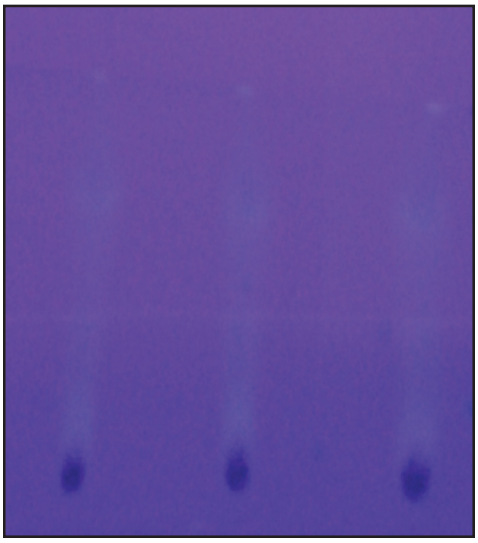
Results and Discussion

Physico-chemical standardization is of prime importance in quality control of Unani drugs. As the efficacy of many drugs mainly depends upon its physical and chemical properties, therefore, the determination of physico-chemical characters for the authenticity of a drug is necessary before studying any medicinal property. Phyto-chemical 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.

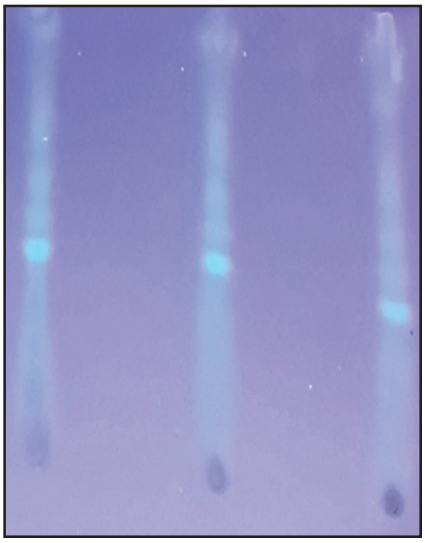
The present study is an attempt to fix-up pharmacopoeial standards of drug 'Sapistan' to ascertain its quality, identity, purity and strength. Powder of the drug has been used for study to bring out several standards like ash, solubility in alcohol and water, successive, extractive values and quality screening of physicochemicals, total alkaloids, total flavonoids, phenol, nitrogen, fatty matter, sterol/ terpenes, protein and carbohydrates.

Based on the various physico-chemical and phytochemical parameters, the drug 'Sapistan' has been standardized to ensure its use in manufacturing quality and genuine herbal preparations.

Sapistan Fruits (*Cordia dichotoma* Forst.f.)



TLC of Alcoholic Extract of Sapistan



TLC of Aqueous Extract of Sapistan

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