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Pharmacognostical And Phytochemical Analysis Of *Kantakari Solanum Xanthocarpum* (Schrad & Wendl.)

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ABSTRACT:

Ayurveda is one of the most ancient system of life, health and care. Indian Science of Medicine has the largest collection of medicinal plants. *Kantakari Solanum Xanthocarpum* (Schrad & Wendl.) of family Solanaceae is one of the '*Dashmoola*' and used drug in *Ayurveda.* References about *Kantakari* are available since *Vedic Kala*, *Samhita Kala, Madhyama Kala*, *Adhunika Kala*. *Ayurveda* describes use of *Kantakari* in wide range of ailments like *Kasa, Shwasa, Jwara, Pinasa, Parsvasoola* etc. the drug is used as hepatoprotective, antiasthmatic, antioxidant, immunomodulatory, wound healing, antispermatogenic, antifertility, antipyretic, anticancer, anti-allergic, anthelmintic, antimicrobial. The phytochemical studies revealed the presence of active constituents, carbohydrates, amino acid, steroids, proteins, saponins, alkaloids, glycosides, and tannins in aqueous and alcoholic extracts.

Keywords: *Solanum xanthocarpum* (Schard & Wendl.), pharmacognostical, phytochemical in aqueous and alcoholic extracts.

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INTRODUCTION:

Kantakari (*Solanum xanthocarpum.*Schrad & Wendl.) is one of the components of *Dashamoola* (A combination of ten root drugs) and is reputed in the treatment of respiratory diseases especially in *Kasa Roga*. This herb has its own medicinal importance since it plays a significant role in the treatment of various diseases. It is used as single drug and in compound formulations. Various synonyms compiled from various ancient texts are given as *Kantakari* (It is a full of thorn), *Rastrika* (It is a common plant available in everywhere), *Shudra* (It has smaller leaves compared to *Bhrihti), Vyaghri* (It improves olifactory function, promotes voice), *Nidigdhdika* (It spreads all over the body very easily), *Duhsparsha* (difficult to touch), *Kasaghni* (It liquefies *Kapha*, allivates cough)[1] Different vernacular names are *Kantakari (Sanskrit*), *Chotikateri (Hindi*), *Kandiyari* (*Punjabi*), *Kantikari* (*Bengali*), *Bhuirigani (Marathi*), *Kandankattiri (Tamil*) Yellow-berried night shade (English)[2] Its parts used for medicinal purpose is *Panchanga* (whole plant). Here, *Panchanga* are *Phala* (Fruits), *Moola* (root), *Pushpa* (Flower), *Kanda* (Stem) and *Patra* (Leaves).[3]

TAXONOMICAL CLASSIFICATION OF *SOLANUM XANTHOCARPUM.* SCHRAD & WENDL

Kingdom	Plantae
Division	Spermatophyta
Sub-Division	Angiospermae
Class	Dicotyledonae
Sub- class	Gamopelatae

Series	Bicarpellatae
Order	Polemoniales
Family	Solanaceae
Genus	Solanum
Species	*Solanum xanthocarpum* Schrad &Wendl.

BOTANICAL DISTRIBUTION[4]

HABITAT- Common in waste lands and road sides throughout India.

Habit- Herb

LEAVES- Ovate or elliptic sinuate or subpinnatified, glabresent, with straight spine.

FLOWER - In few flowered lateral cyme, blue coloured; corolla with shallow lobes.

FRUIT - Globose berries, glabrous, whitish and green bloched yellow when ripe.

SEED - Many glabrous.

Flowers and fruits from March- july.

MATERIAL AND METHODS:

Method of Preparation of powder drug

The fruit of *Kantakari* (*Solanum xanthocarpum.*Schrad & Wendl.) was collected from village Jamba Ramgarh, Jaipur, India in the prescribed month for collection of drug. The *Kantakari* was taxonomically identified and authenticated by Botany Department, University of Rajasthan, Vide reference number RUBL 211728. Sample was shade dried, powdered with mechanical grinder, sieved through 80 mesh and stored in an air- tight glass vessel. This powder was utilized for powder microscopy.

PHARMACOGNOSTICAL STUDY:

Pharmacognostical study was carried on the basis of Morphological characters such as colour, odour, taste, size fracture and findings were recorded.

PHYSICO- CHEMICAL PARAMETERS:

DETERMINATION OF MOISTURE CONTEN:[5]

Moisture content was determined by placing weighed samples of 5gm of each drugs in oven at 105º for 5 hours and calculated weight of the sample for every 30 minute until the weight of the samples were constant, no variation of weight are recorded. This sample was allowed to cool at room temperature in a desiccator for 1 hour before weighing**.**

DETERMINATION OF ASH VALUE:[6]

TOTAL ASH:

Weighed accurately 5 gm of powdered drug sample in the Silica crucible. The drug was spread evenly in to a thin layer. This crucible was placed in a muffle furnace and ignited at a temperature of 450°C for about 6 hrs or more until the ash was totally free from Carbon. The crucible containing the ash was allowed to be cooled in desiccators and subsequently weighed to constant weight.

DETERMINATION OF WATER SOLUBLE ASH:

Boiled the total ash for 5 minutes with 25 ml of water; collect the insoluble matter in a Gooch's Crucible or on an ash less filter paper, Washed with hot water and ignited for 15 minutes at a temperature not exceeding 4500 C. Subtracted the weight of the insoluble matter from the weight of the ash; the difference in weight represents the water soluble ash. Percentage of water soluble ash was calculated with reference to the air dried drug.

DETERMINATION OF ACID INSOLUBLE ASH:

Boiled the total ash with 25 ml of 2M Hydrochloric acid for 5 minutes. Collected the insoluble matter in a Gooch crucible or on an ash less filter paper, wash with hot water, ignite, cool in a desiccator and weigh. Percentage of acid insoluble ash was calculated with reference to the air dried drug.

DETERMINATION OF EXTRACTIVE VALUES:[7]

DETERMINATION OF ALCOHOL SOLUBLE EXTRACTIVE:

Macerate 5 gm of the air dried drug, coarsely powderd of *Solanum xanthocarpum,* with 100 ml of Alcohol of the specified strength in a closed flask for twenty-four hours. Shaking frequently for six hours and allowed to stand for eighteen hours. Filter rapidly, taking precautions against loss of solvent, evaporate 25 ml of the filtrate to dryness in tared flat bottomed shallow dish and dry at 105º, to constant weight and weigh. Calculate the percentage of alcohol-soluble extractive with reference to the air-dried drug.

DETERMINATION OF WATER SOLUBLE EXTRACTIVE:

Macerate 5 gm of the air dried drug, coarsely powderd of *Solanum xanthocarpum,* with 100 ml of water of the specified strength in a closed flask for twenty-four hours. Shaking frequently for

six hours and allowed to stand for eighteen hours. Filter rapidly, taking precautions against loss of solvent, evaporate 25 ml of the filtrate to dryness in tared flat bottomed shallow dish and dry at 105º, to constant weight and weigh. Calculate the percentage of alcohol-soluble extractive with reference to the air-dried drug.

PRELIMINARY PHYTOCHEMICAL ANALYSIS:[8]

The phytochemical analysis of this plant was performed for the detection of active constituents

i. e. carbohydrates, amino acid, steroids, alkaloids, protein, saponin, tannin and glycosides**.**

TESTS OF CARBOHYDRATES:

- **Molisch's Test:**

2 ml of test Solution was taken in a test tube and 2 ml of the Molisch's reagent was added and shaken carefully and then about 1ml. of conc. H_2SO_4 is poured from side of the test tube and allowed to stand for one 1 minute. A Purple colour ring at the junction of the two layers if formed indicated the presence of Carbohydrate.

- **Benedict's test:**

It is used for reducing sugars and composed of mainly Copper sulphate and sodium hydroxide. To the 4 ml of aqueous solution of drug, 1 ml of Benedict's solution was added and heated almost to boiling. Formation of green, yellow, orange, red or brown colour in order of increasing concentrations of simple sugar in the test solution, due to formation of cuprous oxide

- **Fehling solution test:**

It is generally used for reducing sugars and composed of two solutions, which are mixed in situ. Fehling solution A composed of 0.5% of copper sulphate whereas Fehling solution B composed of Sodium Potassium Tartarate.

Equal volumes of Fehling A and Fehling B solutions were mixed (1 ml each) and 2 ml of aqueous solution of drug was added followed by boiling for 5-10 minutes on water bath.

Tests for Alkaloids:

Mayer's reagent test

Dragondroff's reagent test

Wagner's Test

Hager's Test

- **Mayer's reagent test:**

2 ml of test Solution was taken in a test tube to which and 2 ml of the Mayer's reagent (Potassium Mercury Iodide solution) was added. A White or Pale Yellow precipitate if formed indicated presence of Alkaloids

except with Alkaloids of the Purine groups and few others.

- **Dragondroff's reagent test:**
  2 ml of test Solution was taken in a test tube in which 2 ml of the Dragon Droff's reagent (Mixture of Potassium Iodide and Bismuth sub nitrate solution) was added. An orange precipitate if formed indicated presence of Alkaloids.

- **Wagner's Test:**
  Drug solution + few drops of Wagner's reagent (dilute Iodine solution), formulation of reddish-brown precipitate.
- **Hager's Test:**
  A saturated aqueous solution of picric acid was employed for this test. When the test filtrate was treated with this reagent, an orange yellow precipitate was obtained which indicates the presence of alkaloids.

Test for Amino acids:

Ninhydrin test:

The Ninhydrin test is used to detect the presence of alpha-amino acids and proteins containing free amino groups. Protein solution when heated with ninhydrin molecules, it gives characteristic deep blue or pale yellow colour due to the formation of complex between two ninhydrin molecule and nitrogen of free amino acid.

Tests for Proteins:

Biuret test

Xanthoprotic test

Millons test

- **Biuret test :**
  A few mg of the residue was taken in water and 1 ml of 4% sodium hydroxide solution was added to it, followed by a drop of 1% solution of copper sulphate. Development of violet or pink colour indicates the presence of proteins.
- **Xanthoprotic test:**
  A small quantity of test sample was taken with 2 ml of water and 0.5 ml of concentrated nitric acid was added to it. Development of yellow colour indicates the presence of proteins.
- **Millons test:**
  A small quantity of test sample was taken and 2 to 3 ml of millons reagent was added. The white precipitate slowly turning to pink, indicate the presence of proteins.

Test for saponin:

- **Foam test:** A small quantity of the test sample was taken in a test tube and shaken vigorously with a small amount of sodium bicarbonate and water. A stable, characteristic honeycomb like froth indicates the presence of saponins.

Test for glycosides:

- **Borntragor's Test**

  1 ml of Benzene and 0.5 ml of dilute ammonia solution was added to the ethanolic extract and was observed for the formation of reddish pink colour.

Test for Phenolic Compound

- The extract was taken in water and warmed; to this 2 ml of ferric chloride solution was added and observed for the formation of green and blue colour.

Test for Flavonoids:

- **Shinods test:**

  A small quantity of test sample was dissolved in 5 ml ethanol (95%v/v) and reacted with few drops of concentrated hydrochloric acid and 0.5 gm of magnesium metal. Appearance of pink, crimson or magenta colour within a minute or two indicates the presence of flavonoids.

Test for Steroids:

- **Salkoweski reaction :**

  Few mg of extract was taken in 2 ml of chloroform and 2 ml of concentrated sulphuric acid was added from the side of test tube. The test tube was shaken for few minutes. The development of red colour indicates the presence of steroids.

Test for Tannins:

Ferric chloride solution

Lead acetate

Pot. Dichromate

- **Ferric chloride solution:**

  A 5 percent solution of ferric chloride in 90 % alcohol was prepared. Few drops of this solution were added to a little of the above filtrate. Appearance of dark green or deep blue colour indicates the presence of tannins.

- **Lead acetate :**

  A 10 percent w/v solution of basic lead acetate in distilled water was added to the test filtrate. Development of precipitate indicates the presence of tannins.

- **Pot. Dichromate**

  A solution of potassium dichromate was added to the filtrate. Appearance of dark colour indicates the presence of tannins.

THIN LAYER CHROMATOGRAPHY:[9]

T.L.C. plate coated with 0.25 mm layer of silica gel 60 F_{254} with fluorescent indicator, (Mercks) were used. Each plate having dimension 10 cm long and 2 cm width.

Activation of pre-coated silica gel 60 F_{254}

Plates were dried in hot oven at 105^0 c for one and half hour.

Preparation of mobile solution –Toluene: Ethyl acetate (7:3)

RESULTS AND DISCUSSION

In the present study of *Solanum xanthocarpum.* Schrad & Wendl were evaluated for its physicochemical and phytochemical aspects. Organoleptic parameters revealed that the powder of fruit of *Solanum xanthocarpum.* Schrad & Wendl are brown in colour, with the characteristics odour, astringent and bitter in taste. The results of preliminary phytochemical analysis in the aqueous and alcoholic extracts of the drugs showed the presence of carbohydrates, amino acid, protein, steroids, alkaloids, saponins and tannins. (Table2)

POWDER MICROSCOPY OF *SOLANUM XANTHOCARPUM*:

In powder microscopy of *Kantakari* fruit Starch grain, Trichomes, Tracheids, Fibers and Calcium oxalate were seen.

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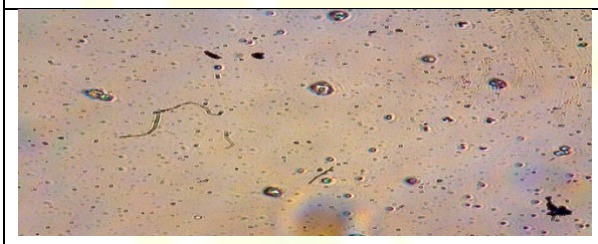
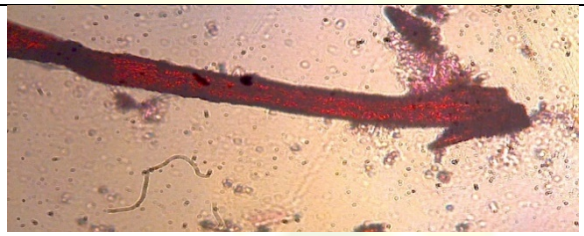
<tr><td colspan="2">  </td><td>  </td></tr>
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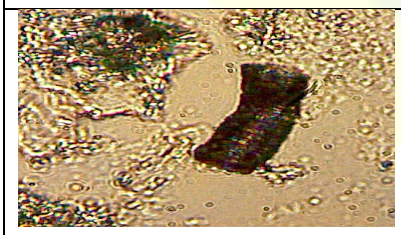
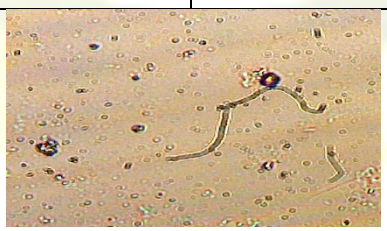
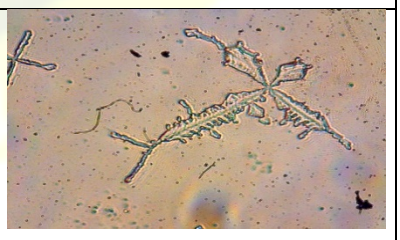
<tr><td>  </td><td>  </td><td>  </td></tr>
<tr><td>Tracheids</td><td>Fibers</td><td>Calcium Oxalate</td></tr>
</table>

Table no. 1. PHYSICO-CHEMICAL ANALYSIS OF *SOLANUM XANTHOCARPUM*:

SR.NO.	PARAMETER	RESULT
1.	Moisture content	10.27% w/w
2.	Aqueous extractive value	16.89% w/w
3.	Alcoholic extractive value	6.88% w/w
4.	Total ash	7.53 % w/w
5.	Acid insoluble ash	2.58 % w/w
6.	Water soluble ash	4.76 % w/w

PHYTO CHEMICAL ANALYSIS OF *SOLANUM XANTHOCARPUM:*

The results of preliminary phytochemical analysis of *Kantakari* fruit in the aqueous and alcoholic extracts of the drugs showed the presence of carbohydrates, protein, amino acid, steroids, saponins, alkaloids and tannins (table 2) which would make the drug useful for treating different ailments as having a potential of providing useful drug for human use.

Table No.2. PHYTOCHEMICAL ANALYSIS OF *SOLANUM XANTHOCARPUM:*

1. Carbohydrates

SR.NO.	NAME OF TEST	AQUEOUS EXTRACT	ALCOHOL EXTRACT
A.	Molisch test	-ve	-ve
B.	Benedict test	+ve	-ve
C.	Fehling test	-ve	-ve
2.	**Amino acids**		
A.	Ninhydrine test	+ve	+ve
3.	**Protein**		
A.	Biuret test	-ve	-ve
B.	Xanthoprotic test	-ve	-ve
C.	Millon's test	+ve	+ve
4.	**Alkaloids**		
A.	Dragondrof test	-ve	-ve
B.	Wagner's test	+ve	+ve
C.	Hager's test	-ve	-ve
5.	**Saponin**		
A.	Foam test	+ve	-ve
	Glycosides		
A.	Borntragor's test	-ve	-ve
7.	**Phenolic Compound**		
A.	Phenolic Compound test	-ve	+ve
8.	**Steroids**		
A.	Salkowaski reaction	+ve	-ve

9.	**Tannins**		
A.	$Fecl_3$ test	-ve	-ve
B	Lead acetate	+ve	-ve
C	Pot. Dichromate	-ve	-ve

THIN LAYER CHROMATOGRAPHY:

Thin layer Chromatography is a tool for separation and identification of chemical constituent present in the herb or chemical mixtures with mobile solution Toluene: Ethyl acetate 7:3. Alcoholic extracts of fruit *Kantakari* Rf value 0.47, 0.54, 0.69, 73

CONCLUSION:

Different Physico-chemical parameters such as moisture content, total ash, acid insoluble ash, water soluble ash, water soluble extractive value and alcoholic soluble extractive value were observed. The phytochemical analysis confirmed the presence of various phytochemical constituents such as carbohydrates, amino acid, protein, alkaloids, saponins, glycosides steroids and tannins. These values can be useful to detect adulteration. All studies standardization parameters like Pharmacognostic study, phytochemical screening and physicochemical parameters provide the knowledge in the identification, authentication of fruit of *Solanum xanthocarpum* Schard & Wendl.

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Conflict of interest :- Nil

REFERENCE:

1. Sharma P.V, Naama Rupajnaanam Satyapriya Prakashan Varanasi; Reprint ed 2015; Page no 38-39.
2. Dr J. L. N. SASTRY, *Dravyaguna Vigyan* Vol- II, Chaukhamba Orientalia Varanasi; Reprint ed 2017 Page.no.367.
3. Sharma P.C,Yelne M.B,Dennis T.J, Database on medicinal plants used in *Ayurveda*, CCRAS,Volume 7,2005. Page no226-231
4. Billore K.V., Yelne M.B., Dennis T.J. and Chaudhari B.G., Database on medicinal plants used in Ayurveda, Vol. 6, Central Council For Research in Ayurveda and Siddha, New Delhi, 2004; 269.
5. CCRAS, Laboratory Guide for analysis of *Ayurveda* & *Sidha* formulation
6. CCRAS, Laboratory Guide for analysis of *Ayurveda* & *Sidha* formulation
7. CCRAS, Laboratory Guide for analysis of *Ayurveda* & *Sidha* formulation
8. CCRAS, Laboratory Guide for analysis of *Ayurveda* & *Sidha* formulation
9. CCRAS, Laboratory Guide for analysis of *Ayurveda* & *Sidha* formulation