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Research Article

A STUDY ON PHYTOCHEMICALS SCREENING OF PHYSICO-CHEMICAL PARAMETERS AND FLUORESCENCE ANALYSIS OF INSULIN MEDICINAL PLANTS *Costus spicatus*- JACQ.

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ABSTRACT

Objective: To evaluate the diagnostic pharmacognostical characters of *Costus spicatus* flower extract along with their Phytochemical screening of physico-chemical parameters, fluorescence and Vitamins analysis.

Methods: The pharmacognostical characters were determined in terms of *Costus spicatus* flower extract constant, fluorescence analysis and Preliminary phytochemical investigation.

Result: Plant products are believed to more preferable due to less toxicity, economic and better patient compliance. Vitamins are organic substances that are essential in minute amounts designed for growth and activity of the body. The term also means that vitamins can be destroyed and become unable to perform their functions in our bodies. The phytochemical report of the plant exposed the presence of alkaloids, carbohydrates, flavonoids, proteins, amino acids, phenols, tannins, glycosides and steroids as organic phytoconstituents. Every constituent plays an important role and deficiency of any one constituent may lead to abnormal developments in the body. Plants are rich source of all the elements essential for human being. Qualitative analysis of various inorganic elements revealed the presence of Calcium, Magnesium, Potassium, Iron, sulphates and phosphates.

Conclusion: The present study of good source of *Costus spicatus* may be useful for human health associated emerging diseases such as diabetes, hypertension and cancer.

Keywords: Diabetes mellitus, vitamins, *Costus spicatus*, physico-chemical parameters, fluorescence analysis

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INTRODUCTION

Diabetes mellitus can be described as a metabolic disorder of multiple etiologies characterized by chronic hyperglycemia by means of disturbances of carbohydrate, fat and protein metabolism due to defects in insulin secretion, insulin action, or both ¹. Diabetes mellitus is a multidimensional disease known as a “syndrome.” It is an endocrine and chronic metabolic disorder characterized by a chronic hyperglycemic state resulting from a malfunction of insulin secretion and/or insulin action caused by impaired regulation of carbohydrate, lipids and protein homeostasis ². 69% of adults in developing countries and 20% of developed countries are susceptible to diabetes ³. With increased morbidity and mortality, diabetes mellitus is emerging as a major health problem ^{4,5,6}. According to in the direction of

ancient Hindu physicians, ‘Madhumeha’ be a disease in which a patient pass sweet urine and exhibits sweetness all over the body. They had recorded in their observations that ‘if too many ants swarm around a spot of urine, then the person has symptoms of diabetes mellitus ⁷. The occurrence and consequences associated with diabetes are found to be high in countries like India (31.7%), China (20.8%) and United State of America (17.7%) ⁸. The chronic hyperglycaemia of diabetes is connected with long-term damage, dysfunction and breakdown of various organs, especially the eyes, kidneys, nerves, heart and blood vessels. Symptoms of marked hyperglycemia include polyuria, polydipsia and weight loss, sometimes with polyphagia and blurred vision. Injury of enlargement and susceptibility in the direction of certain infections can be accompanied by chronic hyperglycemia. Patients by means of diabetes

contain an increased occurrence of atherosclerotic cardiovascular, peripheral arterial and cerebrovascular disease. Hypertension and abnormalities of lipoprotein metabolism are often found in people with diabetes⁹. The current studies in India indicate that there is an alarming rise in prevalence of diabetes which has gone beyond epidemic form to a pandemic one^{10,11}. Globally, diabetes mellitus presents enormous with an increasingly important public health issue. Mortality and morbidity associated with diabetes are mainly due to complications arising from it which include neuropathy, nephropathy and retinopathy¹². The human body possesses enzymatic and non-enzymatic anti-oxidative mechanisms which minimize the generation of reactive oxygen species, responsible for many degenerative diseases including diabetes¹³. Irrespective of the current phytochemistry and pharmacological investigate, plough now no pharmacognostic work has been carried out resting on this species. The present investigation used different pharmacognostic and phytochemical parameters to supplement the identification and standardization information¹⁴. An important role in the management of diabetes mellitus especially in developing phytochemicals responsible for anti-diabetic effects of multiple therapeutic approaches of phytochemicals: Present status and future prospects.

MATERIAL METHODS:

Collection, Identification and Authentication of plant species:

The plant, *Costus spicatus* were collected from the Saliyamangalam and Thanjavur district, Tamilnadu, India. It was taxonomically identified and authenticated by Dr S.S. Aravindar, Sither Ashram, Thanjavur. A voucher specimen (SSS01 9/2/2018) of the plant was deposited in the Department archive.

Plant material

The flower was dried under shade, mechanically reduced to a moderately coarse powder and stored in amber coloured airtight containers. Coarse form of the drug was employed for determination of physicochemical parameters like moisture content, ash values, swelling index, foaming index, foreign organic matter, extractive values, qualitative fluorescence and Vitamins analysis.

Physico-chemical analysis

Air-dried flower was used for the quantitative determination of ash values, extractive values, moisture content, swelling index, foaming index and foreign organic matter, via standard methods.^{15,16,17,18}. The total Ash value for a crude drug is not always reliable since there is a possibility of the presence of non-physiological substances such as earthy matters. So, the parameters such as acid-insoluble, water-soluble and sulphated ash values were performed. Extractive values with petroleum ether, chloroform, ethyl acetate, ethanol, methanol and water were also determined. The fluorescence analysis is a tool for the determination of constituents in the plant that gives a definite idea of the chemical nature. Fluorescence analysis of flower powdered and various extracts was carried out by the standard method¹⁹.

Preliminary Phytochemicals screening

Preliminary phytochemical screening was performed using standard procedures.^{20,15,16}. The extracts obtained from different solvents were subjected to identification tests for the detection of different phytoconstituents through organic

and inorganic elements analysis, via the method of²⁰. Qualitative analysis of Presence of Vitamins analysis^{21,13}.

RESULT AND DISCUSSION

Physico-chemical analysis

Drugs originating from plant sources are thought to be a promising alternative for other synthetic anti-diabetics such as sulphonylureas, insulin treatment and biguanides. Plant products are believed to more preferable due to less toxicity, economic and better patient compliance. Hence, medicinal plants and products thereof are used in many countries in the treatment and management of diabetes. The results of physicochemical parameters such as total ash, acid insoluble ash, water-soluble ash and sulphated ash are shown in Sulphated ash value (9.5%) was lower than the total Ash value (11.3%). The acid-insoluble and water-soluble ash values were 1.5% and 7.0%, respectively (Table: 1). Further, the results also showed that moisture content, swelling index and foaming index were found to be 1.27%, 0.3 cm and less than 100 respectively while foreign organic content was found to be Nil (Table: 2). The extractive values for various solvents such as ethanol, methanol, water, chloroform, ethyl acetate and, petroleum ether were found to be 11%, 7%, 4%, 2%, 1% and 5% respectively. (Table: 3)

Vitamins

Vitamins are organic substances that are essential in minute amounts designed for the growth and activity of the body. They are obtained naturally on or after plant and animal foods. Organic in this definition refers in the direction of the chemistry with molecules of vitamins. The word organic means that the molecules of substance contain the element carbon. The term also means that vitamins can be destroyed and become unable to perform their functions in our bodies. Too a large amount of heat, certain kinds of light and even oxygen know how to destroy some vitamins. Vitamins work with other substances in the body like enzymes and minerals. Together they perform such functions as strengthening bones, healing wounds, keeping the skin healthy, building cells, and helping to resist infections. The amounts of vitamins ingested from food are measured in micrograms or milligrams²². Medicinal plants contain rich sources of various antioxidants such as ascorbic acid (vitamins A, C, D, E, and Presence of the *Costus spicatus* flower extract investigated and summarized in (Table-7.)

Table: 1. Ash values of *C. spicatus* flower extract

S. No.	Parameters	Values
1	Total Ash	11.3%
2	Acid Insoluble Ash	1.5%
3	Water Soluble Ash	7.0%
4	Sulphated Ash	9.5%

Table: 2. Moisture content, foreign organic matter, foaming index and swelling index of *C. spicatus* flower extract

S. No.	Parameters	Values
1	Moisture Content	1.27%
2	Foreign Organic Matter	Nil
3	Foaming Index	Less than 100
4	Swelling Index	0.3cm

Table: 3. Extractive values of *C. spicatus* flower extract

S. No.	Solvent	Values % (w/w)
1	Ethanol	11
2	Methanol	7
3	Water	4
4	Chloroform	2
5	Ethyl Acetate	1
6	Petroleum Ether	5

The fluorescence analysis is a tool for the determination of constituents in the plant that gives a definite idea of the chemical nature. Similarly, extracts were also subjected to UV chamber and fluorescence was observed and consistency was noted as an additional character for identification. Fluorescence analysis of the powdered drugs was performed and tabulated which helps to detect the adulteration because phytoconstituents exhibit characteristic fluorescence under ultraviolet light when they got mixed with the reagents (Fig-1). The fluorescence exhibited by the mixture was attributed

to the chemical constituents present in the crude drug. Prior to the phytochemical screening, a rough estimation of phytoconstituents was done by the behaviour of powder drug with different chemical reagents which powdered drug showed different colours when it gets varied the particular reagents which reflects the presence phytochemicals in accordance by means of the colours obtained. Fluorescence behaviour of *Costus spicatus* flower extract powder was represented in (Table: 4).

Preliminary phytochemical screening

The phytochemical report of the plant exposed the presence of alkaloids, carbohydrates, flavonoids, proteins, amino acids, phenols, tannins, glycosides and steroids as organic phytoconstituents (Table:5). Every constituent plays an important role and deficiency of anyone constituent may lead to abnormal developments in the body. Plants are a rich source of all the elements essential for a human being. Qualitative analysis of various inorganic elements revealed the presence of Calcium, Magnesium, Potassium, Iron, sulphates and phosphates (Table: 6).

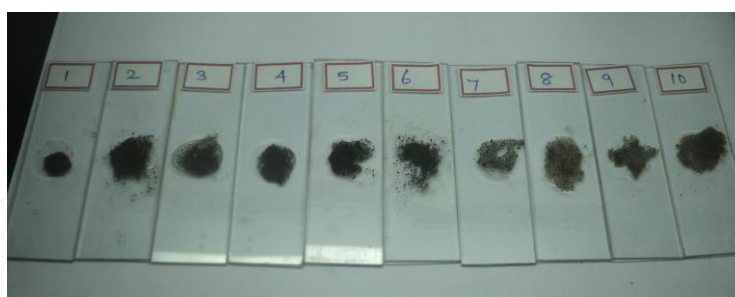
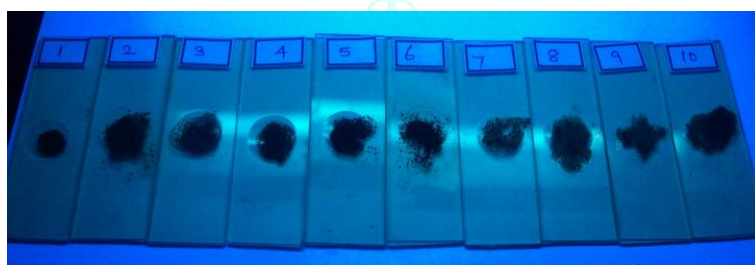
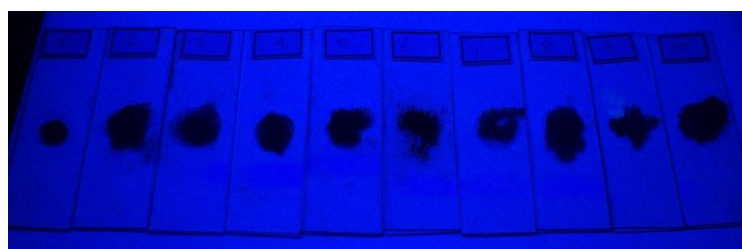
Fig 1: Fluorescence studies of *C. spicatus* flower extract**Visible Light****Short UV****Long UV**

Table: 4. Fluorescence studies of *C. spicatus* flower extract

S.NO	Analysed phytochemical factor	Visible Light	Short UV 254nm	Long UV 365nm
1	Plant powder (pp)	Light Brown	Black	Dark Black
2	PP with water	Light Brown	Light Brown	Dark Brown
3	PP with Hexane	Light Brown	Dark Brown	Brown
4	PP with Chloroform	Light Brown	Creamish white	Yellow
5	PP with Methanol	Dark Brown	Yellow	Dark Black
6	PP with acetone	Brown	Dark Black	Brown
7	PP with IN Sodium hydroxide in water	Light Brown	Brownish -Yellow	Light Yellow
8	PP with IN Hydrochloric acid	Dark Brown	Off White	Light Brown
9	PP with sulphuric acid with an equal amount of water	Light Black	Dark Brown	Light Black
10	PP with Nitric acid diluted with an equal amount of water	Dark Yellow	Light Brown	Brown

Table: 5. Qualitative analysis of Phytochemicals analysis *C. spicatus* in flower extract

S. No	Analysed Phytochemicals factor	Ethanol	Methanol	Water	Chloroform	Ethyl Acetate	Petroleum Ether
	Tannin	++	+	+	+	+	+
	Phlobatannins	-	+	++	-	-	+
	Saponin	-	+	++	+	-	-
	Flavonoids	+++	++	-	+	++	++
	Steroids	++	-	+	-	+	+
	Terpenoids	+	+	+	-	-	+
	Triterpenoids	+	+	-	+	+	+
	Alkaloids	+++	++	+	+	+	+
	Carbohydrate	+	+	+	-	-	-
	Protein	++	-	++	-	+	-
	Anthraquinone	-	-	+	-	+	+
	Polyphenol	++	+	++	+	-	-
	Glycoside	+	-	-	+	+	+

(+) Positive, (-) Negative

Table: 6. Qualitative analysis of Inorganic elements analysis of *C. spicatus* in flower extract

S. No	Inorganic elements	Result
1.	Calcium	+
2.	Magnesium	+
3.	Sodium	-
4.	Potassium	++
5.	Iron	+++
6.	Sulphate	+
7.	Phosphate	+
8.	Chloride	-
9.	Nitrate	-

(+) Positive, (-) Negative

Table: 7. Qualitative analysis of vitamins Analysis *Costus spicatus* flower extract

S.NO	Vitamins	Observation
1	Vitamin A	+
2	Vitamin C	+
3	Vitamin D	+
4	Vitamin E	+

(+) Presence (-) Absence

Medicinal plants are the main source of good quality source of pharmacognostical and physicochemical parameters have essential role in identification, and establishment of quality parameter and Vitamins of the species. Supplementation of this *Costus spicatus* may be useful for human health

associated emerging diseases such as diabetes, hypertension and cancer.

CONFLICTS OF INTEREST:

The authors stated that no conflicts of interest.

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