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PHYTOCHEMICAL AND ELEMENTAL ANALYSIS OF *Jasminum cuspidatum* (L.)

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ABSTRACT

The aim of the study was to find out the phytochemical constituents and evaluate the elements analysis by EDAX of ethanol leaves extract of *Jasminum cuspidatum* (L.) Elements were analyzed by SEM-EDAX method. Phytochemical screening showed the presence of alkaloids, phenols, flavonoids, saponins phytosterols were analyzed by qualitatively and TLC method with specific solvents systems. The powder was showed the presence of various minerals by Scanning Electron Microscope (SEM) with an energy dispersive X-ray spectrometer (EDX) such as C, O, Mg, Al, P, Cl, K, Ca, Fe, Co, Ni, Cu, Zn and Mo. The reports suggested that ethanol extracts of leaves of *Jasminum cuspidatum* showed the presence of essential phytochemicals and elemental activities. Based on the results this can take it further research to identify the active principles of above activities.

KEYWORDS: Phytochemical analysis, TLC, SEM-EDAX, *Jasminum cuspidatum.*

INTRODUCTION

Foods rich in natural antioxidants such as polyphenols, flavonoids are related to reduced risk of incidence of cardiovascular and other chronic diseases and certain types of cancer, which has led to a revival of interest in plant-based foods (Choi *et al*., 2007). On the other hand, food-borne diseases are major dilemma in the third world and developing countries and even in developed nations (Sokmen *et al*., 2004), and the consumption of foods contaminated with microorganisms represents a serious health risk to humans. Most of the antibiotics existing today have a natural origin. Plants produce a variety of compounds to defend themselves from microbial attacks (Sarker *et al*., 2007), and natural products and related drugs were used

to treat 87% of all categorized human diseases, including bacterial infections, cancer and immunological disorders (Newman and Cragg, 2007). Resistance to antibiotics is one of the biggest problems that face public health (Byarugaba, 2004 and Okeke *et al.*, 2005). This problem is a natural consequence of the adaption of infectious pathogens to antimicrobials used in several areas, including medicine, food animals, crop production and disinfectants in farms, hospital and households (Bloomfield 2002, McEwen *et al*., 2002 and Wise and Soulsby, 2002). Phytoconstituents are the natural bioactive compounds active in plants. These phytoconstituents work with nutrients and fibres to form an integrated part of defense system against various diseases and stress conditions (Dipak *et al*., 2010). Macro and micro elements are required for maintenance of human health as well as defense system. Pharmacognostical and preliminary phytochemical screening of the leaves extracts of *Jasminum grandiflorum* has been reported by Raja Sekharan *et al*., (2010), wound healing activity of *J. Grandiflourm* by Mishra *et al*., (2010). The main objective of the study is to determine the phytochemicals as well as phytoelements of leaves of *J. cuspidatum* which is useful in future for determining the efficiency of drugs against the various disease of human body.

MATERIALS AND METHODS

Plant collection

The plant leaves of *Jasminum cuspidatum* was used for the investigation was collected from forest of Thiruvallur, Thiruvallur district, Tamilnadu, India. The voucher specimen was deposited at Presidency College, Department of Plant Biology and Plant Biotechnology, Tamilnadu, India.

Preparation of methanol

The leaves were separated, washed thoroughly with tap water to remove adhered dirt, shade dried and stored in air tight container. The shade dried leaves of the plant were pulverized in a mechanical grinder to obtain coarse powder. The dried powdered leaf material (1kg) was extracted with methanol for 3 times at room temperature. Following filtration, the extract was concentrated by rotor vapor under reduced pressure at 45°C to give a gummy mass. It was preserved in a refrigerator at 4˚C for further use.

Phytochemical analysis

Phytochemical screening of plant extract was carried out according to the method adopted (Evans, 1997; Wagner et al., 1996; Raaman, 2006 and Harborne, 1998).

Thin layer chromatography of methanol extracts for various phytochemicals

Thin layer chromatography (TLC) was carried out on precoated silica gel aluminium sheets (Merck TLC, silica gel 60 F_{254} (20 x 20 cm). The chromatogram was developed by placing the TLC plate in a TLC apparatus containing suitable solvent system. The developed TLC plates were dried at room temperature. The spots were observed under visible as well as UV light (254 and 365 nm), then exposing the plates to iodine vapours. The developed TLC plates were placed in iodine chamber (Harborne, 1998 and Raaman, 2006). The specific solvent system used for TLC such as Chloroform: methanol (9: 1; v/v) for phenol, Toleune: Ethyl acetate (7:3; v/v) flavonoid, ethylacetate: hexane (1:9; v/v) for saponins and Toluene: diethyl ether (1:1;v/v) for phytosterols. The R_f values of the spots were recorded.

$$R_f = \frac{\text{Distance travelled by solute front (in cm)}}{\text{Distance travelled by the solvent front (in cm)}}$$

Energy dispersive X-ray spectroscopy (EDAX Analysis)

The leaves powder of *Jasminum cuspidatum* uniformly sieved and prepared as 400 µ size, which was subjected to the elemental analysis using Scanning Electron Microscope (SEM) with an energy dispersive x-ray spectrometer (EDAX).

RESULTS

Phytochemical screening of Extract and mineral content of leave powder

The phytochemicals screening of *Jasminum cuspidatum of methanol extracts revealed the presence of* different secondary metabolites such as alkaloids, phenols, flavanoids saponins, phytosterols, fixed oil, glycosides, phenolic and carbohydrates, which was shown in Table 1.

The specific solvent system for alkaloids, phenols, flavonoids, saponins and phytosterols were used and TLC analysis showed the fluorescence of specific patterns shown in Table 2. The total phenol content of methanol extracts of leaves was recorded 289 mg/g Dry Weight of Gallic Acid Equivalence and flavanoid content was 357 mg/g Dry Weight of Quercetin Equivalence.

The elemental composition of *Jasminum cuspidatum* using SEM and EDX technique was revealed the presence of various percentages of different elements in Table 3. The SEM images in various ranges Figure 1 and EDX spectra of the powder of the *Jasminum cuspidatum* Figure 2.

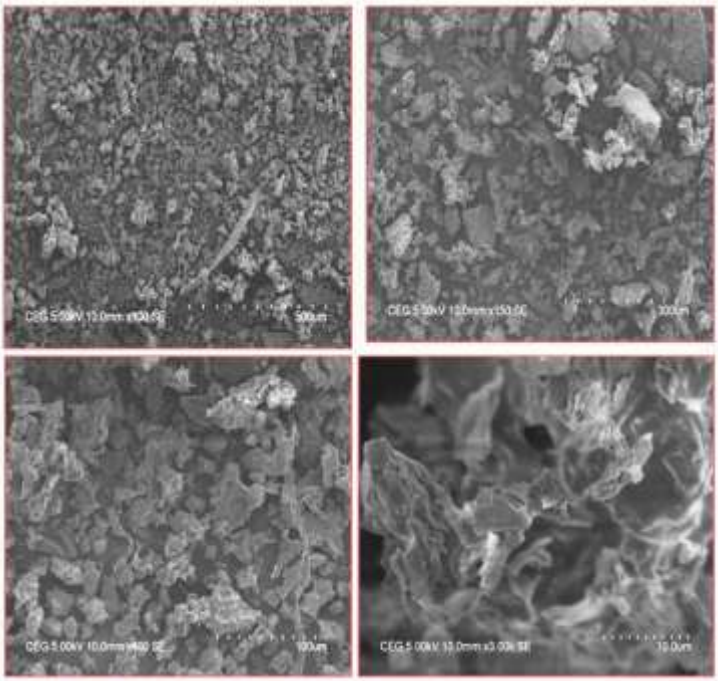

Fig. 1: SEM images of leaves powder of *Jasminum cuspidatum.*

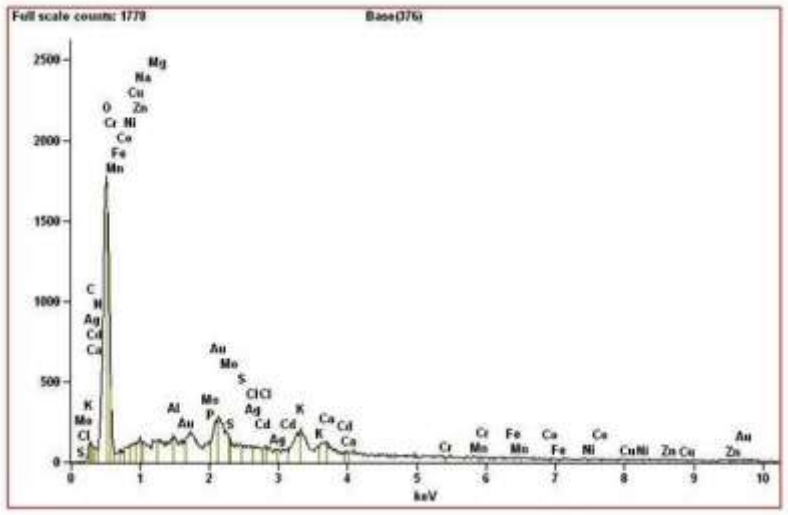

Fig. 2: EDAX spectra of leaves powder of *Jasminum cuspidatum.*

C, O, Mg, Al, P, Cl, K, Ca, Fe, Co, Ni, Cu, Zn, Mo, Cd and Au are present in *Jasminum cuspidatum of leaves of powder*. In all these elements, Oxygen (84.57 %) presented as high concentration while K (3.08%) and Ca (1.64%) presented as moderate amount. But Ni, Cu, Fe presented only a trace quantities. Trace elements are estimated by determining the percentage abundance (%) of elements Mg, Ni, Cl, K and Ca in the sample.

Table 1: Phytochemical screening of methanol extract of leaves of *Jasminum cuspidatum*.

S.No	Phytochemical test	Methanol extract of Leaves
I	**Alkaloids** 1. Mayer's Test	+
	2. Wagner's Test	+
	3. Hager's test	+
	4. Dragendorff' s test	+
II	**Flavonoids** Alkaline reagent test	+
III	**Fixed oil test** 1. Spot test	+
IV	**Carbohydrate** 1. Fehling's test	+
	2. Benedict's test	+
V	**Glycosides** 1. Borntrages's test	+
VI	**Saponins:** Foam test	+
VII	**Phytosterols:** Libermann-Burhard's test	+
VIII	**Phenols** 1. Ferric chloride test	+
	2. Gelatin test	+
	3. Lead acetate test	+

Table 2: TLC profile of methanol extracts of *Jasminum cuspidatum*.

		Phytochemicals			
Visualization	***Alkaloid***	***Phenol***	***Flavanoid***	***Saponins***	***Phytosterols***
Visible	0.6, 0.85, 0.88, 0.91	0.03, 0.20, 0.80, 0.85, 0.92, 0.95	0.22, 0.27 0.30, 0.35 0.43, 0.48 0.62, 0.65 0.68, 0.88 0.97	0.03, 0.07 0.20, 0.98	0.61,0.68,0.86,0.91
UV short	0.61, 0.88, 0.91	0.05,0.27 0.38, 0.53 0.72, 0.90 0.93, 1.00	0.07, 0.22 0.33, 0.48 0.62, 0.67 0.70, 0.87 0.90, 0.93	0.03, 0.08 0.10, 0.18 0.60, 0.73	0.61, 0.68,0.81,0.86,0.91
UV long	0.88, 0.91	0.03, 0.07 0.30, 0.37 0.55, 0.80 0.85,0.92 0.95, 0.98 1.00	0.33, 0.62 0.65, 0.67 0.88,0.93	0.03, 0.07 0.10, 0.15 0.23,0.37 0.73, 0.90	0.41,0.61,0.68,0.78, 0.80,0.88
Iodine derivatives	0.88, 0.91	0.03,0.32 0.37,0.80 0.93,0.97	0.07, 0.15 0.22, 0.47 0.50, 0.63 0.67, 0.70 0.92, 0.95 1.00	0.03, 0.08 0.17, 0.27	0.06,0.58,0.63,0.88

Table 3: The percentage of trace elements present in leaves powder of *Jasminum cuspidatum*.

S.No	Element	Net Counts	Weight %	Atom %
1	*C*	481	4.15	6.64
2	*O*	16023	70.32	84.57
3	*Mg*	305	0.62	0.49
4	*Al*	420	0.82	0.58
5	*P*	495	0.99	0.61
6	*Cl*	77	0.18	0.10
7	*K*	2263	6.26	3.08
8	*Ca*	1043	3.42	1.64
9	*Fe*	12	0.11	0.04
10	*Co*	35	0.40	0.13
11	*Ni*	14	0.20	0.06
12	*Cu*	11	0.20	0.06
13	*Zn*	73	1.98	0.58
14	*Mo*	957	2.65	0.53
15	*Cd*	345	1.51	0.26
s16	*Au*	43	6.19	0.60
Total			100.00	100.00

DISCUSSION

Phytochemical screening is hot theme in the last two decades to identifying the new source of therapeutically and industrial lead compounds from natural resources. Phytochemical investigation of the ethanolic extracts of *Jasminum cuspidatum* revealed the presence of various phytochemicals such as Alkaloids, phenols, phytosteroids, flavonoids, glycoside carbohydrates and saponins. The presence of above secondary metabolites in *Jasminum cuspidatum* may be associated with various kinds of medicinal properties. Phenolic compounds have attracted a great attention in relation to their potential of antimicrobial and antioxidant activities for beneficial effects on health (Narayana *et al*., 2001). Phytochemical analysis of plants for the presence of saponins is widely well known to have expectorant and antitussive activity (Rao *et al.*, 1984; Sharma *et al*., 1984). Phytochemical screening is of paramount importance in identifying new source of therapeutically and industrially valuable compound having medicinal significance, to make the best and judicious use of available natural wealth (Ambasta *et al.*, 1986; Kokate *et al*., 1998).

In the current research, results of SEM-EDAX revealed the presence of trace elements such as Fe, Co, Ni, Cu, Zn, Cl, Mg in the leaves powder of *Jasminum cuspidatum*. Potassium is the third most abundant mineral in human body, identified as the synonym for health insurer. Potassium is the principal positively charged ion (cation) in the fluid inside cells, while

sodium is the principal cation in the fluid outside cells. It is one of the substances found in foods that maintain the body's internal balance of fluids and chemicals. More than 98% of the body's potassium is intracellular; measuring it from a blood sample is relatively insensitive, with small fluctuations in the blood corresponding to very large changes in the total bodily reservoir of potassium. Potassium is found in especially high concentrations within plant cells, and in a mixed diet, it is most highly concentrated in fruits (Bhaskarachary, 2011). It contains qualities for maintaining a high level of human well-being and a cheerful lifestyle (Heyka, 2009). Apart from acting as an electrolyte, this mineral is required for keeping heart, brain, kidney, muscle tissues and other important organs of human body in good condition. Elevations or deficiencies of this important mineral can cause problems and, in the extreme, even death. Maintaining consistent levels of potassium in the blood and cells is vital to body function. Therefore, there is no way one should overlook the inclusion of potassium in routine diet plan (O'Shaughnessy, 2006). According to (Poirier, 1984; Sacks *et al*., 1998)h ealth benefits of potassium is involved in in blood pressure, anxiety, stress, muscular strength, metabolism, heart strokes, kidney disorders, water balance, electrolytic functions, nervous system. EDAX results revealed that highest potassium, *J. cuspidatum* can be prescribed to high blood pressure. Potassium is essential for the transport of nutrients inside the cell. Without potassium, nutrients could not able enter into the cell that lead cell death. Potassium, calcium, and magnesium cations exist together in commonly eaten foods such as fruits, nuts, vegetables, cereals, and dairy products, their intakes are highly correlated. This collinearity makes it difficult in epidemiological studies to distinguish which among these dietary cations has a causal role in blood pressure regulation (Reed *et al*., 1985). *J. caspidatum* also revealed the presence of various mineral content in its leaves powder, this results agreed with previous researcher. Calcium is needed in the development of bone and teeth and it regulate heart rhythm, help in normal blood clotting, maintain proper nerve and muscle functions and lower blood pressure (Bibi *et al*., 2006). In blood coagulation, calcium activates the conversion of prothrombin to thrombin and also takes part in milk clotting. It plays a vital role in enzyme activation. Calcium activates large number of enzymes such as adenosine triphosphatase (ATPase), succinic dehydrogenase, lipase etc. It is also required for membrane permeability, involved in muscle contraction, normal transmission of nerve impulses and in neuromuscular excitability. Reduced extracellular blood calcium increases the irritability of nerve tissue, and very low levels may cause spontaneous discharges of nerve impulses leading to tetany and convulsions (Hays and Swenson, 1985; Malhotra, 1998; Murray *et al*., 2000). Present candidate, *J. cuspidatum* has 1.64% of calcium atom, which

could be good source of calcium minerals. Magnesium is important cofactor for the conversion of blood glucose into energy (Bahadur *et al*., 2011). Silicon is also another important element to prevent the hardening of veins and arteries. Chloride works with sodium and potassium carry an electrical charge when dissolved body fluids and to regulate the pH in the body. Chloride is also important for digest the food properly and absorbs many elements. Trace elements play both curative and preventive role in combating diseases (Saravanaprabha and Gopalakrishnan, 2014). Similarly (Afsar *et al*., 2014) flower of *Jasminum humile* of different extracts showed the various concentration of phenol content (mg/g)in different extracts on dry weight basis in ethyl acetate (173 mg), butanol (129 mg) hexane (84 mg). Similarly methanol extracts *J. cuspidatum* revealed the presence of 289 mg/g DWGAE and flavanoid content was 357 mg/g DWQE.

CONCLUSION

The results obtained from the present study revealed that, the methanol extracts of *Jasminum cuspidatum* showed the presence of the secondary metabolites in the plant leaves. Considerable amount of macro elements was also present. The presence of phytochemicals along with minerals can make *J. cuspidatum*, a potential drug. However further study is necessary to quantify and evaluate biological activity of the particular compound for drug development.

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