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Phytochemical Screening and Pharmacognostical Evaluation of *Rumex vesicarius* L.

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Abstract: *Rumex vesicarius* L (Polygonaceae) traditionally used as asperient, astringent, diuretic, and cooling agent. The plant juice is useful in curing stomach heat, toothache, and checks nausea. The present study was carried out to screen preliminary phytochemical and pharmacognostical characters of this species. The principal constituents of *Rumex vesicarius* L. include phenols, tannins, flavonoids, saponins, triterpenoids, alkaloids, anthraquinones, quinines, reducing sugars, proteins, lipids and carbohydrates.
Key words: *Rumex vesicarius*L., Phytochemical, Pharmacognostical characters.

Introduction

Ancient Indian literature incorporates a remarkably broad definition of medicinal plants and considers all plant parts to be used as potential sources of medicinal substances[1]. Herbal medicine has been practiced world wide and is now recognized by WHO as essential building blocks for primary health care[2]. Generally herbal formulations involve use of fresh (or) dried plant parts. Correct knowledge of such crude drug is very important aspect in preparation, safety and efficacy of the herbal products. Pharmacognosy is a simple and reliable tool by which complete information of the crude drug can be obtained[3]. However a key obstacle which has hindered the acceptance of the alternate medicines in the developed countries is the lack of documentation and stringent quality control. There is a need for documentation of research work carried out on traditional medicines[4].

With this back drop it becomes extremely important to make an effort towards the standardization of the plant material to be used as medicine. The process of standardization can be achieved by stepwise pharmacognostic studies. Simple Pharmacognostic techniques used in standardization of plant material include its morphological, anatomical and biochemical characteristics. *Rumex vesicarius* L. is one of green vegetable medicinally valuable plant belongs to family Polygonaceae. It is commonly called as “Bladder dock”. The plant is asperient, astringent, diuretic, leaves used as cooling agent. Seeds used for curing dysentery. Plant juice is used as a cooling agent curing stomach heat, toothache and to check nausea. In the present study pharmacognostic standards of the plant is studied. The standards are utmost importance in not only finding out genuity but also in detection of adulterants in marketed drugs[5].

Materials and Methods

Plant materials and extract preparation

Rumex vesicarius L. collected from the plains of Thiruvannamalai, Thiruvannamalai district, Tamilnadu, SouthIndia during the months of January-February 2010. The collected plants were shade dried and coarsely powdered. The coarse powder were then subjected to successive extractions by using various solvents with gradual increasing polarities such as N-hexane, chloroform, ethyl acetate, ethyl alcohol and water by using soxhlet apparatus. The collected extracts were then taken up for further investigations.

Preliminary phytochemical and pharmacognostical screening

Preliminary phytochemical screening

The preliminary phytochemical studies was carried out by following standard methodologies to screen out the specific identities. The extract residues of the plant were subjected to phytochemical screening to screen the presence of various active phytocompounds like phenols, tannins, flavonoids, saponins, triterpenoids, alkaloids, anthrauinones, primary metabolites like protein, lipid, carbohydrate and Vitamin E and Vitamin C.

Pharmacognostical screening

The pharmacognostical investigations were conducted in terms of fluorescence analysis. Physicochemical parameters like ash, crude fibre content were analysed to evaluate the quality and purity of the crude drug containing inorganic radicals like phosphates, carbonates, potassium, magnesium and calcium. The ash value is a measure of inorganic constituents present in the raw drug. High ash content explains its unsuitable nature to be used as a drug. In the present study the total ash, water soluble ash and acid insoluble ash had been analyzed.

The elemental analysis was determined by an Atomic Absorption Spectrometer (AAS), Perkin Elmer. Hg and Se were estimated using a hydride generator attached to the AAS. The extractive values with organic solvents were carried out in the increasing polarity following The Indian Pharmacopoeia to calculate the percentage of solubility[6] .

Table 1 Qualitative analysis of primary and secondary metabolites of *Rumex vesicarius* L.

Phytoconstituents	n Hexane	Ethylacetate	Chloroform	Ethanol	Water
Proteins	-	+	+	+++	+
Lipids	+++	+++	+++	++	-
Carbohydrates	-	+	++	++	+++
Reducing Sugar	-	-	+++	++	+++
Phenols	+++	+++	+++	+++	+++
Tannins	+	+	+	+	+
Flavonoids	+	+	+	+	+
Saponins	-	-	-	+	+++
Triterpenoids	-	-	-	++	-
Alkaloids	-	-	-	-	-
Anthraquinones	-	-	-	-	-
Quinones	-	-	-	+	+

Table 2 Quantitative analysis of primary metabolites.

Assay	n-Hexane (% w/w)	Chloroform (% w/w)	Ethyl Acetate (% w/w)	Ethanol (% w/w)	Water (% w/w)
Phenol	4.16±0.02	1.65±0.02	15.71±0.10	8.76±0.05	10.58 ±0.03
Tannin	0.67±0.03	0.67±0.01	0.95±0.05	1.39±0.15	1.28±0.04
Flavonoid	2.44±0.05	1.01±0.06	0.46±0.06	3.67±0.09	8.31±0.32
Vitamin E	5.10±0.97	0.80±0.08	1.39±0.51	0.31±0.04	0.55±0.06
Vitamin C	0.54±0.01	0.89±0.01	5.22±0.51	1.65±0.16	6.55± 0.64

Values are expressed as mean±SEM (n=3)

Table 3 Quantitative analysis of secondary metabolites of *Rumex vesicarius* L.

Analysis		% W/W
Ash Values (%w/w)	Total Ash	21.48
	Acid insoluble ash	44.10
	Water soluble ash	58.97
Extractive values (%)	n hexane	2.0
	Chloroform	2.67
	Ethyl acetate	2.10
	Ethanol	8.46
	Water	16.19
Crude fibre content (%w/w)	76.39	

Values are expressed as Mean±SEM (n=3)

Table 4 Physio-chemical analysis of *Rumex vesicarius* L.

Assay	n-Hexane (% w/w)	Chloroform (% w/w)	Ethyl acetate (% w/w)	Ethanol (% w/w)	Water (% w/w)
Protein	0.62±0.012	5.38±0.01	15.38±0.047	20.77±1.24	7.69±0.25
Lipid	2.96±0.001	4.88±0.021	2.06±0.02	2.80±0.01	0.15±0.004
Carbohydrate	0.22±0.01	0.210.01	0.23±0.01	0.30±0.01	0.35±0.11

Table 5 Elemental analysis of *Rumex vesicarius* L.

Elements	% W/W (ppm)
Fe	0.85
Zn	0.07
Cu	0.78
Mn	0.13
Co	0.07
Pb	0.10
As	2.34
Hg	0.43
Se	1.70

Results

Preliminary Phytochemical studies

The preliminary phytochemical screening of *Rumex vesicarius* L. was undertaken for the identification of different chemical constituents present in the aerial parts, individual screening of the extracts indicated the presence of all major phytoconstituents. The phytochemical screenings are presented in Table 1. Ethanol, water and chloroform extracts showed the highest amount of phytoconstituents like proteins, lipids, carbohydrates, reducing sugar and phenols. Tannins, flavonoids, saponins, triterpenoids and quinones were detected in trace. Alkaloids and anthraquinones were totally absent in all the five extracts. The n-Hexane and Ethylacetate extract showed very few presences of the phytoconstituents.

The quantitative analyse of the primary and secondary metabolites were estimated and presented in the Table 2&3 respectively Primary metabolites like protein, lipid and carbohydrate were analyzed, ethanol (20.77 %) and ethyl acetate (15.38 %) extracts showed maximum percentage protein content while the n-Hexane (0.62 %) extract showed minimum value. The chloroform extract showed maximum lipid content (4.88%) while water extract (0.15 %) showed minimum percentage of lipid. The water extract showed maximum carbohydrate content (0.35 %) while the chloroform extract (0.21 %) showed minimum percentage of carbohydrate.

Secondary metabolites like phenol, tannin, flavonoid, and vitamin E & C were analyzed. Ethyl acetate (15.71%) extract showed maximum percentage of phenol while the chloroform (1.65%) extract showed minimum percent of phenol. Ethanol (1.39%) extract

showed maximum percentage of tannin whereas the chloroform and n-Hexane (0.67 %) extracts recorded minimum percentage of tannin. Water extract (8.31 %) showed maximum percentage of flavonoid while the ethyl acetate extract (0.46 %) showed minimum percentage of flavonoid. n-Hexane (5.10 %) extract showed maximum percentage of vitamin E while the ethanol (0.31%) extract showed minimum percentage of vitamin E, and Vitamin C (6.55 %) extract showed maximum percentage of vitamin C while the n-Hexane (0.54 %) extract showed minimum percentage of vitamin C.

Physicochemical studies

The ash analysis, extractive values and crude fibre content are presented in the Table 4. Mean of ash values were recorded 21.48% of total ash was present, 58.97% of water soluble ash was present and with 44.10% of acid insoluble ash was recorded. The extractive values of different solvents have been analyzed to find out the percentage of extractive values. Maximum percent of water extractive value was obtained as 16.19% followed by ethanol as 8.46%, chloroform with 2.67%, ethyl acetate with 2.10%, and n-Hexane showed minimum percent of extractive value with 2.0%. 76.39% of Total crude fibre content was recorded.

The AAS elemental analysis of the plant was presented in the Table 5, presence of nine elements were observed. Arsenic (As) with 2.34 recorded highest value followed by Selenium (Se) with 1.70, Zinc (Zn) and Cobalt (Co) showed lowest value of 0.07.

Preliminary pharmacognosy studies

The chemical analysis and fluorescence analysis of the plant powder were done by treating the plant powder with various chemical reagents, and separate observations was made under normal light and UV light, the colour changes of the plant powder was recorded and presented in the Table 6 and 7.

Table 6 Chemical analysis of *Rumex vesicarius* L.

Sl. NO.	Treatment	Observation
1	Powder as such	Grey green
2	Powder with 50% Sulphuric acid	Green
3	Powder with concentrated Sulphuric acid	Blakish brown
4	Powder with 50% Hydrochloric acid	Light brown green
5	Powder with concentrated Hydrochloric acid	Dark green
6	Powder with 50% Nitric acid	Reddish brown
7	Powder with concentrated Nitric acid	Brick red
8	Powder with 10% Sodiumhydroxide	Brownish green
9	Powder with Sodiumhydroxide and water	Brown
10	Powder with 5% Ferric chloride	Black
11	Powder with 5% Potassium hydroxide	Yellowish brown
12	Powder with Water	Grey
13	Powder with Ethanol	Grey green
14	Powder with Acetic acid	Yellow green

Table 7 Fluorescence analysis of *Rumex vesicarius* L.

Sl. NO.	Treatment	Observation under normal light	Observation under UV light
1	Powder as such	Grey green	Grey
2	Powder with 50% Sulphuric acid	Green	Dark green
3	Powder with 1N Hydrochloric acid	Yellow green	Green
4	Powder with 50% Nitric acid	Reddish brown	Black
5	Powder with 50% Hydrochloric acid	Light brown green	Green
6	Powder with 1N Sodiumhydroxide and water	Yellowish brown	Dark green
7	Powder with Ethanol	Brownish green	Blackish green

Discussion

From the time of immemorial, plants have been widely used as curative agents for variety of diseases. All plant parts synthesize some chemical substances in themselves which metabolize their physiological activities. These phytochemicals are used to cure the diseases in herbal medicine. Nowadays most of the people like to use the traditional methods to cure general diseases. The present work was focused on the aerial edible parts of *Rumex vesicarius* L. for the presence of phytochemical compounds, pharmaco - gnostic characters and physiochemical parameters like ash analysis, extractive values, crude fibre content, elemental analysis and florescence analysis. Several researchers contributed similar type of investigation in different plant species like *Vicoa indica*(L.)DC.[6], *Dioscorea oppositifolia* L.[2], *Ruta graveolens* L.[7], *Mimosa pudica L.*[8], *Acacia nilotica* L.[9], *Tridax procumbens L.* [10] and *Ocimum sanctum L.*[11].

In conclusion, the pharmacognostic investigations on physicochemical characteristics and fluorescence analysis shows that authentic botanical of this crude drug prevents adulteration, substitution and has a crucial role in standardization of crude drugs. The preliminary phytochemical screening of *Rumex vesicarius* L. indicates the presence of primary and secondary metabolites, has an essential role in medicine. Overall, the present study indicates the phytochemical properties and pharmacognostic characters which paves way for further studies on the plant for the presence of active compounds and their biological activity.

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