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Evaluation of Standardization Parameters of Roots and Flowers of *Plumeria Pudica* Linn.

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Abstract

Plumeria pudica Linn. (Nag champa) belongs to family Apocynaceae is aromatic and medicinally important plant, commonly found wild in some parts of our country, till yet no any systematic studies has been carried out in evaluating the species as concerned to development of standardization parameters, therefore, the plant was selected for present investigation. In the present investigation various standardization parameters which include macroscopy, physicochemical evaluation and fluorescence analysis of powdered plant drug were carried out.

Key-words: Standardization, *Plumeria pudica*, Root, Flowers

Introduction

A major lacuna in herbal medicine is the lack of drug standardization, information and quality control. Most of the medicines are in the form of crude extracts which are a mixture of several ingredients and the active principles when isolated individually fail to give desired activity. This implies that the activity of the extract is the synergistic effect of it's varies components. In the absence of Pharmacopeic data on the various plant extracts, it is not possible to isolate or standardize the active contents having the desired effects. Research on the rationale and methodology of Ayurvedic medical practice; isolation of active constituents and their development into new therapeutics; standardization and validation of known herbal medicines and other related aspects are needed. [1-2]

Plumeria pudica L. is a fast-growing, medium size tree that is botanically belongs to family Apocynaceae. The plant can reach a height up to 5-8 feet with many branches on the upper part. Small trees or herbs with obanceolate leaves. Leaves are alternate, bounded at twig tips, strongly recovered margin .flowers are white, fragrant, in corymbose clusters. The white flowers bearing five petals and have fragrance. Iridoid glycosides were the first medicinally active compounds isolated from the species of *Plumeria.* Subsequently the latex and oil of some of these species were found to have other medicinally active constituents like sterols, carbohydrates, tannins, triterpenoids and alkaloids. Similar constituents were subsequently isolated from various extracts of roots and areal parts of these plants in varied compositions. The plant is used for the cure of rheumatism, diarrhoea, blennorhea, venereal disease, leprosy, psychosis and diuresis etc. Plumeria species have also been investigated for isolation of irridoids and triterpenoids, which exhibited algicidal, antibacterial and cytotoxic activities. [3-6]

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Material and Methods

Selection and Collection of Plant Material

Plumeria pudica Linn. (Nag champa) belongs to family Apocynaceae is aromatic and medicinally important plant, commonly found wild in some parts of our country, till yet no any systematic studies has been carried out in evaluating the species as concerned to development of standardization parameters and pharmacological screening, therefore, the plant was selected for present investigation.

Authentication of Plant/Plant Material

The selected plant were collected in the months of July 2019 from the various sites of Malwa region of Madhya Pradesh and identified & authenticated by Dr. S. N. Dwivedi, Retd. Prof. and Head, Department of Botany, Janta PG College, A.P.S. University, Rewa, (M.P.) and was deposited in our Laboratory, Voucher specimen No. J/Bot/PP/176. The various part of the plants i.e., root and flowers were collected, dried under shade, powdered and stored in an air-tight container for further use.

Development of Standardisation Parameters

Pharmacognostical Evaluation

Macroscopic studies

The macroscopy of different parts (Roots & Flowes) of the plant such as color, odor, size, shape, taste, surface characters and fractures were carried out. [7-8]

Physicochemical Evaluation

The dried parts (Roots & Flowers) of *Plumeria pudica* Linn. (Nagchampa) were subjected to standard procedure for the determination of various physicochemical parameters. [9-13]

Successive Extraction of Roots and Flowers

Sample were shattered and screened with 40 mesh. The shade dried coarsely powdered roots and flowers of *Plumeria pudica* Linn. (250 g) were loaded in Soxhlet apparatus and was extracted with petroleum ether (60-62°C), chloroform, ethanol and water until the extraction was completed. After completion of extraction, the solvent was removed by distillation. The extracts were dried using rotator evaporator. The residue was then stored in a dessicator and percentage yield was determined. [9-13]

Preliminary Phytochemical Screening of Extract

The various extract obtained after extraction were subjected for phytochemical screening to determine the presence of various phytochemical present in the extracts. The standard procedure was adopted to perform the study. [9-13]

Fluorescence Analysis of Powdered drug

Powdered drug was screened for fluorescence characteristics with and without chemical treatment. The observations pertaining to their color in day light and under ultra-violet (short and long) were noticed. [14-15]

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Development of physical characteristics (Micromeretic evaluation)

The raw ingredient were evaluated for their physical properties in form of tap density, bulk density, angle of repose, Hausner's ratio and Carr's index by using standard method. [16]

Results and Discussion

The macroscopy of different parts of the selected plant viz., PPR= *Plumeria pudica* Linn. Roots and PPF= *Plumeria pudica* Linn. Flowers such as color, odor, size, shape, taste, surface characters and fractures were carried out. The results were presented in table 1. The dried plant parts of PRR= *Plumeria pudica* Linn. Roots and PPF= *Plumeria pudica* Linn. Flowers were subjected to standard procedure for the determination of various physicochemical parameters. The results were presented in table 2. The extracts obtained were evaluated for pH, color and % yield. The results are presented in table 3.

Table 1: Macroscopic studies of *Plumeria pudica* Linn. (Roots and Flowers)

S/No.	Parameters	PPR	PPF
1.	Color	Light brown to pale	White
2.	Odor	Odorless	Characteristics
3.	Taste	Sweet	Sweet
4.	Shape	Cylindrical	Corolla=5, Oval
5.	Size	Variable	Variable
6.	Fracture	Absent	Absent

Fig. 1: Photo of *Plumeria pudica* Linn. (Roots and Flowers)

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Table 2: Physicochemical Evaluation of *Plumeria pudica* Linn. (Roots and Flowers)

S/No.	Parameters	PPR	PPF
1.	FOM	3.08±0.02	1.11±0.08
2.	LOD	3.65±0.01	2.09±0.17
3.	TA	8.18±0.15	6.13±0.02
4.	AIS	3.19±0.11	2.32±0.22
5.	WSA	4.75±0.03	3.15±0.10
6.	SI	1.21±0.18	0.96±0.02
7.	WSEV	14.39±1.17	9.09±0.02
8	ESEV	10.35±1.01	5.39±0.03

Note: All values are expressed as Mean±SEM, n=3

Table 3: Estimation of % Yield of Various Extract of *Plumeria pudica* Linn. (Roots and Flowers)

S/No.	Extract	Parameters			
		Nature of Extract	Color	pH	% Yield
1.	PPEPPR	Semi solid	Green	7.1	2.35
2.	CEPPR	Semi solid	Dark green	6.9	6.41
3.	EEPPR	Solid powder	Light brown	7.0	11.34
4.	AEPPR	Solid powder	Brown	7.0	15.20
5.	PEEPPF	Sticky solid	Pale Yellow	6.8	1.10
6.	CEPPF	Sticky solid	Light brown	7.2	2.12

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7.	EEPPF	Solid powder	Dark brown	7.1	7.15
8.	AEPPF	Solid powder	Dark brown	7.0	9.34

Abbr.: PEE= Petroleum ether extract; CE=Chloroform extract; EE= Ethanolic extract; AE=Aqueous extract, PPR= *Plumeria pudica* Linn. Roots, PPF= *Plumeria pudica* Linn. Flowers

The various extract obtained after extraction were subjected for phytochemical screening to determine the presence of various phytochemical present in the extracts. The standard procedure was adopted to perform the study.

Table 4: Preliminary Phytochemical Screening of *Plumeria pudica* Linn. Roots

S/No.	Constituents	Root Extract			
		PEE	CE	EE	AE
1.	Carbohydrates	+	+	+	+
2.	Glycosides	-	-	-	-
3.	Alkaloids	+	-	+	+
4.	Protein & Amino acid	-	-	+	+
5.	Tannins & Phenolic compounds	-	-	-	-
6.	Flavonoids	-	-	-	-
7.	Fixed oil and Fats	-	-	-	-
8.	Steriods & Triterpenoids	-	+	+	+
9.	Waxes	-	-	-	-
10.	Mucilage & Gums	-	-	-	-

Table 5: Preliminary Phytochemical Screening of *Plumeria pudica* Linn. Flowers

S/No.	Constituents	Flower Extract			
		PEE	CE	EE	AE
1.	Carbohydrates	+	+	+	+
2.	Glycosides	-	-	-	-
3.	Alkaloids	+	+	+	+
4.	Protein & Amino acid	-	-	-	+
5.	Tannins & Phenolic compounds	-	-	-	-
6.	Flavonoids	-	-	+	+
7.	Fixed oil and Fats	-	-	-	-
8.	Steriods & Triterpenoids	-	+	+	+
9.	Waxes	-	-	-	-
10.	Mucilage & Gums	-	-	-	-

+ = Present; - = Absent

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The dried plant parts of *Plumeria pudica* were examined under ordinary light and UV light (short and long). The powder was also treated with various chemical reagents and the changes in colour were recorded and reported in Table 6.

Table 6: Fluorescence analysis of *Plumeria pudica* Linn. Roots

S/No.	Powder Crude Drug + Reagents	Day Light	UV (Short) 254 nm	UV (Long) 366 nm
1.	Powder crude drug as such	Brown	Light brown	Dark Brown
2.	Drug + 5% $FeCl_3$	Light brown	Light brown	Grey
3.	Drug +1M H_2SO_4	Green	Yellowish green	Dark green
4.	Drug + Dil. HNO_3	Green	Green	Light green
5.	Drug + 5%NaOH	Light brown	Light brown	Dark brown
6.	Drug + 5%NaOH + Water	Light green	Light green	Light green
7.	Drug + 5% Iodine	Brown	Light brown	Dark Brown
8.	Drug + Conc. HNO_3	Light brown	Light brown	Grey
9.	Drug + Ethanol	Green	Yellowish green	Dark green
10.	Drug + Dil. HCl	Green	Green	Light green

Table 7: Fluorescence analysis of *Plumeria pudica* Linn. Flowers

S/No.	Powder Crude Drug+ Reagents	Day Light	UV (Short) 254 nm	UV (Long) 366 nm
1.	Powder crude drug as such	Brown	Brown	Black
2.	Drug + 5% $FeCl_3$	Yellow brown	Light brown	Light brown
3.	Drug +1M H_2SO_4	Violet	Violet	Dark violet
4.	Drug + Dil. HNO_3	Light green	Dark green	Dark green
5.	Drug + 5%NaOH	Brown	Brown	Black
6.	Drug + 5%NaOH + Water	Violet	Violet	Dark violet

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7.	Drug + 5% Iodine	Light brown	Brown	Brown
8.	Drug + Conc. HNO_3	Light brown	Yellow	Yellow
9.	Drug + Ethanol	Dark brown	Dark brown	Dark brown
10.	Drug + Dil. HCl	Yellow brown	Light brown	Light brown

The air-dried powder plant parts of PRR= *Plumeria pudica* Linn. Roots and PPF= *Plumeria pudica* Linn. Flowers were subjected to standard procedure for the determination of various physical characteristics i.e., micromeretic evaluation. The results were presented in table.

Table 8: Micromeretic Parameters of *Plumeria pudica* Linn. Roots and Flowers

Sample	Parameters				
	Bulk Density (g/ml)	**Tapped Density (g/ml)**	**Hausner's Ratio**	**Carr's Index**	**Angle of Repose (θ)**
PPR	0.475	0.5111	1.07	7.06	22.11
PPF	0.426	0.503	1.18	15.30	20.39

Conclusion

The macroscopic studies of roots and flowers were studied and These studies can be used as a diagnostic tool for the correct identification of the species of and aims at setting the anatomical standards to establish quality control parameter for the raw material. Therefore, these features are useful in detecting the adulterants if any in this plant and will lead to efficacy and purity of the selected plant. Hence, these findings will be helpful in the correct identification, identity and purity of the selected medicinal plant. The physicochemical evaluation of roots and flowers of *Plumeria pudica Linn.*. was carried out. In this study ash values (total ash, acid insoluble ash and water soluble ash), moisture content, swelling index and foreign organic matters were determined. The Fluorescence analysis of powdered drug of roots and flowers powders of *Plumeria pudica Linn.* in various solvents were examined under ordinary light and UV light (short and long). The powder was also treated with various chemical reagents viz., 5% $FeCl_3$, 1M H_2SO_4, dil. HNO_3, 5%NaOH, 5%NaOH + Water, 5% Iodine, conc. HNO_3, Ethanol and dil. HCl and the changes in colour were recorded. Exhaustive successive extraction of the powdered plant material were carried by shade dried coarsely powder of roots and flowers of *Plumeria pudica Linn.*. with petroleum ether, chloroform, ethanol and water in a soxhlet apparatus. The percentage yield, color, nature and pH of the extract were recorded and presented in Chapter 5. The percentage of various extract were recorded and presented. Other parameters viz., color, nature and pH of extract were also recorded. Preliminary phytochemical screening of pet. Ether, chloroform, ethanol and aqueous extract of root and flowers of *Plumeria pudica Linn.*. were carried out which revealed the presence of various active phyto-constituents.

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