

Development of Quality Control Parameters for Jacaranda mimosifolia D.Don and Ochna obtusata DC. through Integrated Pharmacognostic, Phytochemical, Physico-chemical and HPTLC evaluation - An Original Article

Chalotra S^{1*}, Goyal A²

DOI:10.21760/jaims.11.4.19

^{1*} Sakshi Chalotra, Final Year Post Graduate Scholar, Dept of Dravyaguna, Government Ayurvedic College, Patiala, Punjab, India.

² Ankita Goyal, Lecturer, Dept of Dravyaguna, Government Ayurvedic College, Patiala, Punjab, India.

Introduction: The ancient wisdom in Ayurveda medicine is still not exhaustively explored; several medicinal plants remain undocumented in classical texts and are termed Anukta Dravyas. Scientific validation and standardisation of such plants are essential to ensure their authenticity, safety, and therapeutic efficacy. Jacaranda mimosifolia D.Don and Ochna obtusata DC. are two such plants with reported ethnomedicinal importance but limited pharmacognostic documentation.

Objectives: The present study aims to establish pharmacognostic standards and evaluate the physicochemical, phytochemical, and chromatographic profiles (HPTLC) of the leaves of Jacaranda mimosifolia and Ochna obtusata DC.

Materials and Methods: Leaves of both plants were collected, authenticated, shade-dried, and powdered for analysis. Macroscopic and microscopic evaluations, Physicochemical, Qualitative phytochemical screening, HPTLC were performed.

Results: The powder microscopy study of Jacaranda mimosifolia D.Don leaves revealed the presence of stomata, Trichomes, calcium oxalate prisms, stone cells etc. Ochna obtusata DC. Exhibited stomata, Fragments of bordered pitted vessels, vascular bundle, calcium oxalate crystals etc. In J.M &O.O, these were present Alkaloid (+, +), Carbohydrates (+, +), Proteins (-, +), saponins (+, +), flavonoids (+, +), Cardiac glycosides (+, +) Coumarin (+, +), Steroid &Triterpenoids (+, +) respectively. pH (5,6), Foreign matter (Nil,Nil), L.O.D (2.07%,2.75%), Total Ash value (6.49%,8.74%), Acid insoluble ash (0.84%)1.05%), Water soluble ash (26.8%,22.72%), Alcohol soluble extract (11.92%, 12.08%), HPTLC study of Sample A showed thirteen spots at 366nm and Sample B showed nine spots at 254nm and ten spots at 366nm.

Conclusion: The present findings are useful in establishing pharmacognostic and phytochemical physicochemical, HPTLC standards for identification, as well as assessment of purity and quality of this plant.

Keywords: HPTLC, Microscopy, Phytochemical, Physico-Chemical, Standardisation, Jacaranda mimosifolia, Ochna obtusata

Corresponding Author

Sakshi Chalotra, Final Year Post Graduate Scholar,
Dept of Dravyaguna, Government Ayurvedic College,
Patiala, Punjab, India.
Email: sakshichalotra1996@gmail.com

How to Cite this Article

Chalotra S, Goyal A, Development of Quality Control Parameters for Jacaranda mimosifolia D.Don and Ochna obtusata DC. through Integrated Pharmacognostic, Phytochemical, Physico-chemical and HPTLC evaluation - An Original Article. J Ayu Int Med Sci. 2026;11(4):125-131.
Available From
<https://jaims.in/jaims/article/view/6415/>

To Browse



Manuscript Received
2026-01-12

Review Round 1
2026-02-02

Review Round 2
2026-02-18

Review Round 3
2026-03-05

Accepted
2026-03-25

Conflict of Interest
None

Funding
CCRAS PG STAR scheme

Ethical Approval
Not required

Plagiarism X-checker
11.21

Note



© 2026 by Chalotra S, Goyal A and Published by Maharshi Charaka Ayurveda Organization. This is an Open Access article licensed under a Creative Commons Attribution 4.0 International License <https://creativecommons.org/licenses/by/4.0/> unported [CC BY 4.0].



Introduction

The traditional system of *Ayurveda* is a vast repository of medicinal knowledge that primarily relies on plant-based drugs for the prevention and treatment of various diseases. Classical Ayurvedic texts describe numerous medicinal plants; however, many botanicals used in folk and regional practices remain undocumented. Such unexplored or insufficiently described plant drugs are referred to as *Anukta Dravyas* (undocumented drugs).

The scientific validation and standardization of these plants are essential to expand the Ayurvedic pharmacopeia and ensure their safe and effective therapeutic application.

In recent years, there has been increasing interest in identifying and evaluating *Anukta Dravyas* through modern pharmacognostical and phytochemical approaches. *Jacaranda mimosifolia* D.Don and *Ochna obtusata* DC. are two such plants that, despite their traditional and ethnomedicinal uses, lack detailed documentation in classical Ayurvedic literature. The leaves of these plants are known to possess potential therapeutic properties, necessitating their systematic scientific investigation.

Jacaranda mimosifolia D.Don is an ornamental tree belonging to the family Bignoniaceae, widely distributed in tropical and subtropical areas of the world. It is commonly called as blue trumpet tree, Blue Jacaranda or Nili-Gulmohar due to its bell shaped spectacular and vivacious blue flowers which are arranged into clusters.

Traditionally, the plant is recognized for the treatment of hypertension, syphilis, rheumatism, venereal diseases and urinary tract problems. Decoction of bark is used in regulation of fertility and lactation.

Bark infusion is used as lotion for healing ulcers. Leaves and bark are recommended in treatment of neuralgia. Scientifically, it is reported to have antioxidant, antibacterial, cytotoxic, anti-obesity, antiplasmodial, anti-cholinesterase, hepatoprotective and antihyperglycemic properties.[1]

Ochna obtusata DC. Belonging to Ochnaceae family is a medium-sized an exotic medicinal plant of Chotanagpur plateau. It is locally called as Bhuiin Champa by the tribals of Jharkhand.

Ochna obtusata DC has antiulcer, anticholinergic, antioxidant, antihyperlipidemic, neuroprotective activities. It is characterised by the presence of secondary metabolites like flavonoids and terpenoids and it is extensively used in the treatment of epilepsy, menstrual disorders, asthma, ulcers. The leaves were used to cure, fever, inflammation, cholera, dysentery, dry cough, bronchitis, sores, cancer, lumbago, snake bite, menstrual complaints, asthma and epilepsy.[2]

Therefore, the present study aims to carry out a comprehensive pharmacognostical, physicochemical, phytochemical, and HPTLC analysis of the leaves of *Jacaranda mimosifolia* D.Don and *Ochna obtusata* DC., in order to establish their identity, purity, and chemical profile. This investigation will contribute to the scientific validation of these *Anukta Dravyas* and support their inclusion in evidence-based herbal medicine.

Materials and Methods

(A) Plant collection and authentication

The Sample A - *Patra* (Leaves) of *Jacaranda mimosifolia* D.Don and Sample B - *Patra* (Leaves) of *Ochna obtusata* DC. were collected from the campus of the Government Ayurvedic College, Motibagh, Patiala, Punjab. Identification was confirmed through comparative analysis with existing Floras and standard herbarium samples, further validated by a subject matter expert. Following collection, the leaves were shade dried. The samples were authenticated and approved by the Drug Testing Laboratory, Patiala.

(B) Pharmacognostical Study

Macroscopic evaluation

The macroscopy study is the morphological characters/ description of the plant parts (Leaf) were observed by naked eye. Detail documentation of the samples external features was performed using a microscope equipped with a digital camera.

Microscopy and Powder Microscopy

The sample was presented in a fixative solution. The fixative used was FAA (Formalin 5ml + Acetic Acid 5ml + 70% Ethyl Alcohol, 90ml). The material was left in FAA for more than 48 hours. The presented specimen was cut into a thin transverse section using a Sharp blade.

The section was stained with a transverse section using a Sharp blade.

The section was stained with Safranin. The transverse section was mounted on the slides and then observed under a microscope. Sections were photographed using digital camera. Powder Microscopy of the powdered sample A, B was done and was observed.

(C) Qualitative Phytochemical Screening

1. Detection of Alkaloids

A. Dragendorff's Test

In a test tube, 2 mL of water was taken, and a few drops of Dragendorff's reagent were added with the help of a dropper, and it was observed. Reddish brown-or orange-coloured precipitates were observed, which indicates the presence of alkaloids.

B. Mayer's Test

In a test tube, 2 mL of water was taken, and a few drops of Mayer's reagent were added with the help of a dropper, and it was observed. Formation of creamy white precipitates indicates the presence of an alkaloid.

2. Detection of Carbohydrates

A. Molisch Test

2 ml of the test solution was taken in a test tube, and 2 ml of Molisch's reagent was added and shaken carefully. And then about 1 ml of concentrated H₂SO₄ was poured from the side of the test tube and allowed to stand for 1 minute. A purple colour ring at the junction of the two layers is formed, indicating the presence of carbohydrates.

B. Benedict Test

Take 2 mL of aqueous plant extract in a test tube and add 2 mL of Benedict's reagent. Heat the mixture in a water bath for 2–5 minutes and observe any color change. The formation of a green, yellow, orange, or brick-red precipitate indicates the presence of reducing sugars.

C. Fehling Test

Mix equal volumes (1 mL each) of Fehling's solution A (copper sulfate) and Fehling's solution B (alkaline tartrate) freshly before use. Add 2 mL of this mixture to 2 mL of aqueous plant extract in a test tube.

Heat the contents in a water bath for a few minutes. The formation of a brick-red precipitate confirms the presence of reducing sugars.

Prepare reagents freshly, ensure proper mixing, and avoid overheating for accurate detection.

3. Iodine Test

A few drops of iodine solution were added to an ethanolic solution of the drug.

Formation of blue colour, which disappears on heating and reappears on cooling, indicates the presence of starch.

4. Detection of Proteins

A. Ninhydrin Test

0.2% Ninhydrin reagent was added with the help of a dropper in 2ml extract of and boiled for a few minutes in a hot water bath. A characteristic purple color indicates the presence of amino acids.

B. Milon's Test

Take 1 ml of the test solution in a test tube and add a few drops of Milon's reagent.

White precipitates are produced, which turn red after heating for 5 minutes on spirit lamp, indicates the protein content in the sample.

5. Detection of Saponin Glycosides

A. Foam Test

To 1 gm of drug, add 10-20 ml of water, shake for a few minutes, and form a froth that persists for 60-120 seconds in the presence of saponins.

6. Detection of Flavonoid Glycosides

A. Ammonia Test

A filter paper dipped in an alcoholic solution of the drug was exposed to ammonia vapor, resulting in the formation of a yellow spot on the filter paper.

B. Shinoda Test

In 2ml extract of samples, magnesium turnings are added with the help of forceps, and concentrated HCl is added with the help of a dropper and observed.

Pink, red, orange, or magenta colour appears on the addition of conc. HCL indicating the presence of flavonoids/ phenolic compounds.

7. Detection of Resins

A. Acetone Test

2 ml extract of sample were taken and mixed with distilled water and acetone. If the test is positive, turbidity appears.

8. Detection of Tannins

A. Ferric Chloride Test (FeCl_3 Test)

Take 2–3 mL of aqueous or alcoholic plant extract in a test tube and add a few drops of freshly prepared 5% ferric chloride solution. Observe for any immediate color change. A green, blue, black, or violet coloration indicates the presence of phenolic compounds or tannins.

9. Detection of Cardiac Glycosides

A. Keller Killiani's Test

To the 2 ml extract of, 5 ml water, and 0.5 ml of strong lead acetate solution were added, then shaken and filtered. Filtrate was treated with an equal volume of chloroform and evaporated to dryness.

Then, 3 ml of glacial acetic acid was added with the help of a dropper to the residue, followed by the addition of a few drops of ferric chloride solution. This solution was transferred to a test tube containing 2 ml of concentrated sulphuric acid.

A reddish- brown layer is formed, which turns bluish green after standing due to the presence of digitoxose.

10. Detection of Coumarin Glycosides

A. FeCl_3 Test

To the concentrated ethanolic extract of the drug, a few drops of FeCl_3 were added. Formation of deep green colour, which turned yellow on the addition of conc. HNO_3 indicates the presence of coumarins.

11. Detection of Steroids and Triterpenoid Glycosides

A. Salkovaski Test

Alcoholic solution of the drug was evaporated to dryness and extracted with CHCl_3 , adding conc. H_2SO_4 from the sidewall of the test tube to the CHCl_3 extract. Formation of yellow coloured ring at the junction of two liquids, which turns red after 2 minutes, indicated the presence of a steroid moiety.

(D) Physicochemical Evaluation

Physicochemical parameters of the extract like pH, Foreign Matter, Loss on drying, Total Ash value, Acid insoluble ash, Water soluble extract were determined using the methods described in the Ayurvedic Pharmacopoeia. Test were done at Drug testing laboratory, Patiala (as shown in Table no.2)

(E) HPTLC Study

HPTLC Chromatograph of ethanolic extract of *Jacaranda mimosifolia* and Methanolic extract of *Ochna obtusata* DC. was developed using solvent system Toluene:EthyAcetate:Methanolic (7:2:1), Scan wavelength - UV light at 254nm, 366nm by using CAMAG Linomat 5, Material TLC Silica gel 60 F254. Test was done at HHRC Amritsar. (as shown in Table no. 3, Fig. no.5)

Results and Discussion

(A) Macroscopic and Microscopic Analysis

Macroscopy

***Jacaranda Mimosifolia* leaves** - Alternately arranged, bipinnate, double compound, feathery leaves were observed in *Jacaranda mimosifolia* D.Don. Each leaf comprised 10 to 30 pairs of pinnae with each pinna containing several pairs of spiny leaflets. Freshly collected leaves were green in color, odorless with bitter taste. The leaves were around 45cm in length while the average length and width of leaflets found 1.5cm and 0.2 to 0.3cm, respectively. The leaflets were lanceolate, symmetrical at the base having parallel venation, acute apex and entire margin. Fig. no.1(A)

***Ochna obtusata* DC. Leaves** - simple, alternate, distichous; stipules caduceous and leaving scar; petioles ca. 0.4 cm Planoconvex, glabrous; lamina 16x5cm, elliptic-oblong, apex acute to rounded, base acute to rounded, margin serrate, shining above, Chartaceous, glabrous beneath; midrib raised above; secondary nerves ca. 12 pairs, ascending towards apex; tertiary nerves slender, reticulate-per current. Fig. no.1(B)

Microscopy

***Jacaranda mimosifolia* D.Don** - The transverse section of leaf indicated dorsiventral lamina. It possessed single layer of upper and lower epidermis.

Upper epidermis comprised of tubular cells covered with thin layer of cuticle. Unicellular uni serrate trichomes were detected on the epidermal surface. The midrib region contained vascular bundle comprising lignified xylem and phloem vessels. The vascular bundle was enclosed within thick walled collenchyma tissues. Fig. 2 (C)

***Ochna obtusata* DC.** - The transverse section of leaf showed outermost layer covered by distinct cuticle, beneath this lies upper epidermis composed of compactly arranged cells. The mesophyll region is clearly differentiated with elongated palisade cells situated just below epidermis, followed by loosely arranged spongy mesophyll cells, collenchyma is observed, oxalate crystals are present within the mesophyll. The vascular bundle is well developed, consisting of xylem and phloem. (Fig. 2 D)

Powder Microscopy - Microscopic powder examination of *J. mimosifolia* leaf displayed different characteristics such as lignified vascular bundles, prismatic calcium oxalate crystals and unicellular covering trichomes, stomata, fibro vascular tissue stained with Phloroglucinol- HCL and vein inlet, stone cells were present in cortex region (Fig. 3)

Powder microscopy of *Ochna obtusata* DC. Shows the distinct stomata, Fragments of bordered pitted vessels, the presence of thick walled parenchyma cells, well defined xylem vessels are observed. Numerous calcium oxalate crystals, starch grains were observed. It also exhibits vascular bundle fragments. These characteristics are shown in (Fig. 4)

A) Macroscopy of leaves of *Jacaranda mimosifolia* Don and *Ochna obtusata* DC.



(A)

Figure 1: Macroscopy of leaf A) Leaves of *Jacaranda mimosifolia* D.Don B) Leaves of *Ochna obtusata* DC. B) Microscopy of leaves of *Jacaranda mimosifolia* D.Don and *Ochna obtusata* DC.

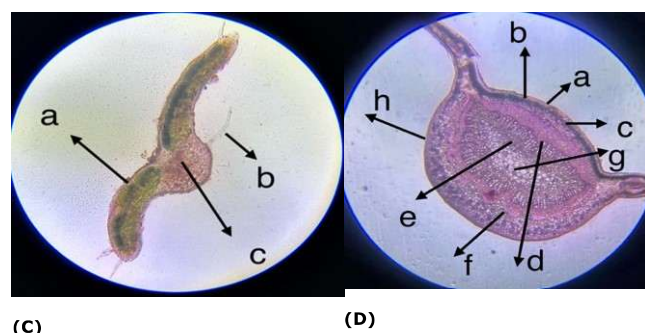


Figure 2: Microscopy of leaf (C) *Jacaranda mimosifolia* D.Don a) Cuticle b) unicellular uni serrate trichome c) Xylem and Phloem. (D) *Ochna obtusata* DC. Leaf a) Cuticle b) Upper epidermis c) Palisade (d) Phloem (e) Xylem (f) Collenchyma (g) Mesophyll (h) Lower epidermis

Powder Microscopy

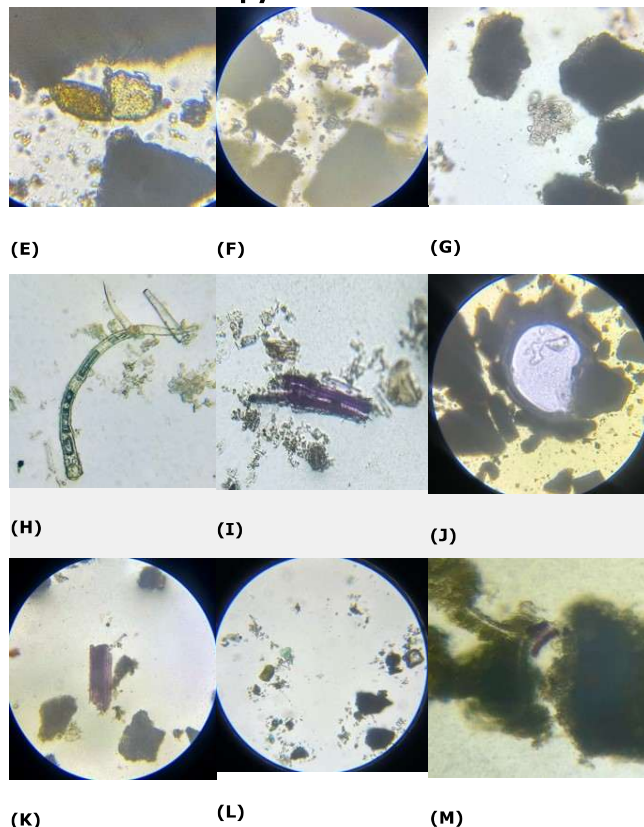


Figure 3: Powder microscopy of *Jacaranda mimosifolia* D.Don leaves (E) Stone cells (F) Stomata (G) Epidermal cells (H) Trichomes (I) Fibrovascular tissue stained with Phloroglucinol- HCL (J) Oil globule (K) Lignified vascular bundles (L) Simple prisms of calcium oxalate (M) Vein inlet.

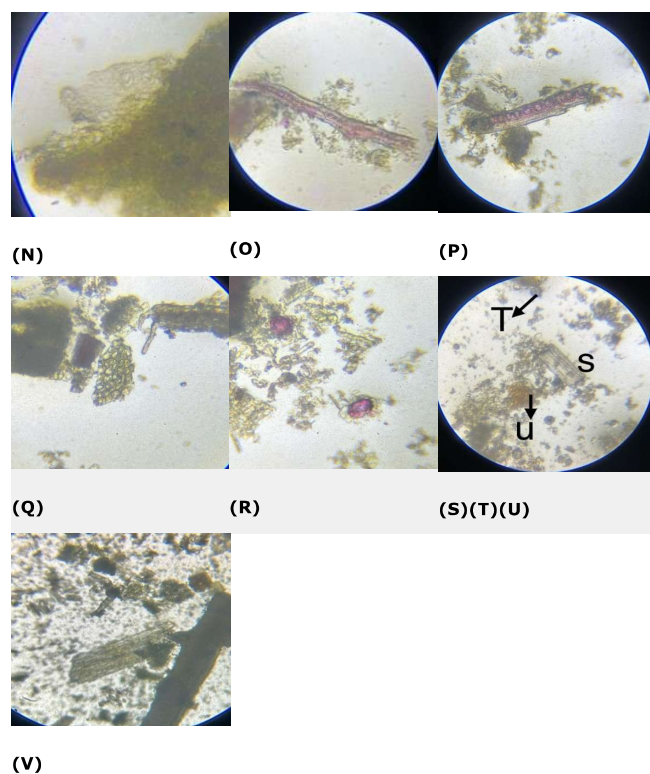


Figure 4: Powder microscopy of *Ochna obtusata* DC. (N) Stomata (O) Fragments of bordered pitted vessels (P) Xylem vessels (Q) Thick wall parenchyma (R) Calcium oxalate crystals (S) Vascular bundle (T) Starch grains (U) Clusters of cells (V) Bundle of fibres

(B) Results of Phytochemical analysis are tabulated in Table no. 1 of Sample-A (*Jacaranda mimosifolia* D.Don) and Sample-B (*Ochna obtusata* DC.).

Table 1: Results of Phytochemical testing of Sample- A and Sample- B.

SN	Metabolites	Tests	Sample-A	Sample-B
1.	Alkaloid	Dragendorff's Test	+	+
		Mayers Test	-	-
2.	Carbohydrates	Molisch Test	+	+
		Benedict Test	+	+
		Fehling Test	+	+
3.	Starch	Iodine Test	-	-
4.	Proteins	Ninhydrin Test	-	-
		Millons Test	-	+
5.	Saponins	Foam Test	+	+
6.	Flavonoids	Ammonia Test	+	-
		Shinoda Test	-	+
7.	Resins	Acetone Test	-	-
8.	Tannins	FecI ₃	+	+
9.	Cardiac glycoside	Keller Killiani Test	+	+
10.	Coumarin	FecI ₃	+	+
11.	Steroid & Triterpenoid	Salkovaski Test	+	+

The results of the preliminary Phytochemical screening showed the presence of Alkaloids, Carbohydrates, Saponons, Flavonoids, Tannins, Cardiac glycosides, Coumarin, Steroid & terpenoids in *Jacaranda mimosifolia* D.Don leaves. However, Leaves of *Ochna obtusata* DC. showed the presence of Alkaloids, Carbohydrates, Proteins, Saponins, Flavonoids, Tannins, Cardiac glycosides, Coumarin, Steroid & terpenoids.

(C) Results of Physicochemical Parameters are tabulated in Table no. 2 of Sample - A (*Jacaranda mimosifolia* D.Don) and Sample-B (*Ochna obtusata* DC.)

Table 2: Results of Physicochemical Parameters of Sample - A and Sample - B

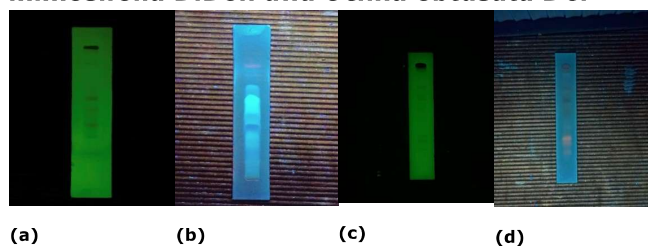
SN	Tests/ Analysis parameter	Sample-A	Sample-B
1.	Identification/ H.P.T.LC	Confirmed	Confirmed
2.	Microscopy	Confirmed (varying in size of leaves, greenish)	Confirmed (varying in size of leaves, greenish)
3.	pH	5.0	6.0
4.	Foreign matter	Nil	Nil
5.	Loss on Drying (L.O.D)	2.07%	2.75%
6.	Total Ash value (TA)	6.49%	8.74%
7.	Acid Insoluble Ash (A/A)	0.84%	1.05%
8.	Water Soluble Extract (WSE)	26.8%	22.72%
9.	Alcohol- Soluble Extract (ASE)	11.92%	12.08%

(D) Results of HPTLC are tabulated in Table no. 3 of Sample-A (*Jacaranda mimosifolia* D.Don) and Sample- B (*Ochna obtusata* DC.)

Table 3: Results of HPTLC Studies of Sample-A and Sample-B

Sample	Solvent system	HPTLC Rf Value (254nm)	HPTLC Rf Value (366nm)
Leaves of <i>Jacaranda mimosifolia</i> D.DON	Toluene: Ethyl Acetate: Methanol (7:2:1)	-	0.04,0.10,0.15, 0.21,0.24,0.29, 0.36,0.49,0.57, 0.61,0.66,0.84, 0.90
Leaves of <i>Ochna obtusata</i> DC.		0.03,0.26,0.32, 0.38,0.41,0.51, 0.63,0.80,0.84	0.04,0.08,0.24, 0.36,0.46,0.51, 0.57,0.69,0.74, 0.79

Figure 5: HPTLC pictures of *Jacaranda mimosifolia* D.Don and *Ochna obtusata* DC.



HPTLC of *Jacaranda mimosifolia* D.DON Under (a) 254nm and (b) 366nm *Ochna obtusata* DC. Under (c) 254nm and (d) 366nm

Conclusion

Although traditional systems of medicine have relied on herbal drugs since ancient times, awareness regarding their acceptance is steadily increasing in society. Growing health consciousness among people has made them more cautious about the potency and possible side effects of herbal medicines, emphasizing the need for proper authentication and quality assurance before their use. To fulfil the demand for high-quality herbal drugs, comprehensive pharmacognostic standardisation is essential. The present study established the pharmacognostic parameters of *Jacaranda mimosifolia* D.Don and *Ochna obtusata* DC. In this standardization process, macroscopic, microscopic, physicochemical, Phytochemical, HPTLC were also established. The parameters identified in this study will aid in ensuring the authenticity and quality of *Jacaranda mimosifolia* D.DON and *Ochna obtusata* DC. to be taken for further studies and research article.

Acknowledgement

We would like to express our gratitude for the financial support provided by the Central Council for research in Ayurvedic Sciences (CCRAS) through the PG STAR scheme for this study. Their contribution helped us for the smooth execution for our research.

References

1. Patrakar RG, Bhusnure OG. Pharmacognostic standardization of *Jacaranda mimosifolia* leaves and stem bark. *Indian Drugs*. 2019 Jun;56(6):31–6. [Crossref][PubMed][Google Scholar]
2. Marandi RR. Phytochemical profiling of *Ochna obtusata* DC. var. *pumila* (Buch. -Ham. ex DC): an endangered ethnomedicinal plant of Jharkhand. *World J Pharm Res*. 2018;7(1):ISSN 2277-7105 [Crossref][PubMed][Google Scholar]

Disclaimer / Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of Journals and/or the editor(s). Journals and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.