International Journal of Pharmaceutical research and Applications
Volume 11, Issue 3, May-June2026, pp:2033-2037 www.ijprajournal.com ISSN:2456-4494

Pharmacognostical Studies on the Roots of *Alstonia Scholaris* (L.) R.Br.

Anchu Raj, Indira G
[1]*Student, College of Pharmaceutical Sciences, Government Medical College, Thiruvananthapuram, Kerala*
[2]*Professor, College of Pharmaceutical Sciences, Government Medical College, Thiruvananthapuram, Kerala*
Corresponding Author: Anchu Raj

Date of Submission: 14-06-2026 Date of Acceptance: 26-06-2026

ABSTRACT: *Alstoniascholaris* (L.) R.Br. belonging to the family Apocynaceae is a well-known medicinal plant traditionally used in various indigenous systems of medicine. This study was undertaken to establish the pharmacognostical and physicochemical standards of the roots of *Alstoniascholaris* (L.) R.Br. The study included macroscopic, microscopic and powder microscopic evaluation of the root along with physicochemical parameters and fluorescence analysis of the powdered drug. Macroscopic studies revealed the characteristic external features of the root. Microscopic evaluation showed the presence of diagnostic characters such as cork, cortex, phloem, xylem, medullary rays, fibres, vessels and starch grains. Powder microscopy also revealed important identifying features of the powdered root. Physicochemical parameters such as total ash, acid-insoluble ash, water-soluble ash, sulphated ash, loss on drying and extractive values were determined. Fluorescence analysis of the powdered drug with different chemical reagents was also carried out. The results obtained may serve as useful standards for the identification, authentication and quality control of the crude drug.

KEYWORDS: *Alstoniascholaris* (L.)R.Br., Root, Pharmacognosy, Microscopy, Physicochemical parameters, Fluorescence analysis

I. INTRODUCTION

Medicinal plants have been used since ancient times for the treatment and management of various diseases.[1]They continue to play an important role in healthcare systems due to the presence of a wide variety of bioactive constituents. Standardization of crude drugs is essential for ensuring the identity, purity, quality and safety of herbal medicines.

Alstoniascholaris (L.) R.Br., commonly known as Devil tree or Saptaparni, belongs to the family Apocynaceae. It is an evergreen tropical tree widely distributed in India and other Asian countries. Different parts of the plant such as bark, leaves, roots and latex have been traditionally used in folk medicine for various therapeutic purposes.[2]The plant is reported to possess several medicinal properties and is used in the treatment of fever, respiratory disorders, gastrointestinal disturbances and skin diseases.[3,4]

Although various parts of *Alstoniascholaris*(L.)R.Br. have been studied for their medicinal importance, standardization of the crude drug is essential for proper identification and prevention of adulteration.[5]Therefore, the present study was undertaken to evaluate the pharmacognostical and physicochemical characteristics of the roots of *Alstoniascholaris* (L.) R.Br. which may serve as useful diagnostic parameters for its authentication and quality control.

II. MATERIALS AND METHODS

Plant Material Collection and Authentication

The roots of *Alstoniascholaris*(L.)R.Br.were collected from Nooranad, Alappuzha District, Kerala, India, during the month ofDecember, 2025. The plant material was authenticated by Dr. Dintu K P, Department of Botany, Fatima Mata National College, Kollam. A voucher specimen (Voucher No. FMNCH 985) was deposited in the herbarium for future reference.

The collected roots were washed thoroughly with water to remove adhering soil and foreign matter, shade dried, coarsely powdered and stored in an air-tight container for further studies.

Reagents and Chemicals

All the reagents and chemicals used in the present study were of analytical grade and obtained from standard sources.

Macroscopic Evaluation

The roots of *Alstoniascholaris*(L.)R.Br.were subjected to macroscopic evaluation for organoleptic and morphological characters such as colour, odour,

International Journal of Pharmaceutical research and Applications
Volume 11, Issue 3, May-June2026, pp:2033-2037 www.ijprajournal.com ISSN:2456-4494

taste, size, shape, surface characteristics, fracture and texture.

Microscopic Evaluation

Fresh root samples were used for microscopic studies. Thin transverse sections of the root were taken manually and cleared using chloral hydrate. The sections were stained with the staining reagentphloroglucinol and hydrochloric acid. The stained sections were mounted in glycerin and observed under a compound microscope under different magnifications. Photomicrographs were taken for documentation.[6,7]

Powder Microscopy

The shade dried root was powdered and the powder was passed through sieve no :18 and retained on sieve no : 60. A small quantity of the powdered drug which was treated with suitable reagents and mounted in glycerin for microscopic examination. Diagnostic characters such as fibres, vessels, cork cells and starch grainswere observed and recorded.[8]

Determination of Physicochemical Parameters

The powdered root drug was subjected tophysicochemical evaluation to determine the following parameters using standard pharmacopoeial procedures:

- Loss on drying
- Total ash
- Acid-insoluble ash
- Water-soluble ash
- Sulphated ash
- Alcohol-soluble extractive value
- Water-soluble extractive value
- Ether-soluble extractive value
- Crude fiber content
- Determination of inorganic constituents in the ash[9]

Fluorescence Analysis

Fluorescence analysis of the powdered root drug was carried out by treating the powder with different chemical reagents and observed the colour changes under visible light, short UV light (254 nm) and long UV light (365 nm).[10]

III. RESULTS AND DISCUSSION

Macroscopic evaluation

The root of*Alstoniascholaris*(L.)R.Br. was found to be brown to greyish-brown in colour externally and pale yellowish to cream colour internally. The odour is characteristic and the taste is distinctly bitter. The roots were cylindrical, elongated and irregular in shape with varying thickness depending on the age of the plant. The outer surface is rough.The characteristic macroscopic features are useful in the preliminary identification of the crude drug.

Table 1. Macroscopic characters of roots of *Alstoniascholaris* (L.)R.Br.

Parameter	Observation
Colour	Greyish brown, inner surface is cream colored
Odour	Characteristic odor
Taste	Bitter taste
Shape	Cylindrical and elongated
Surface	Rough in nature
Texture	Hard and tough

Fig. 1. Morphology of *Alstoniascholaris* (L.)R.Br. root

Microscopic evaluation

The transverse section of the root showed the characteristic anatomical features of the crude drug. The outermost region consisted of the cork cells. Beneath this, the cortex was composed of parenchymatous cells. The vascular bundles and medullary rays were observed. A central pith wasalso observed.

These microscopic characters are important features for the identification and standardization of the roots of *Alstoniascholaris* (L.)R.Br.

International Journal of Pharmaceutical research and Applications
Volume 11, Issue 3, May-June2026, pp:2033-2037 www.ijprajournal.com ISSN:2456-4494

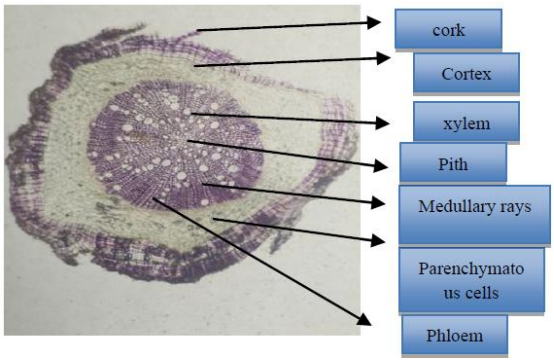

Fig. 2. Transverse section of *Alstoniascholaris* (L.)R.Br. root stained with the reagent Phloroglucinol-HCl and observed under magnification 5X.

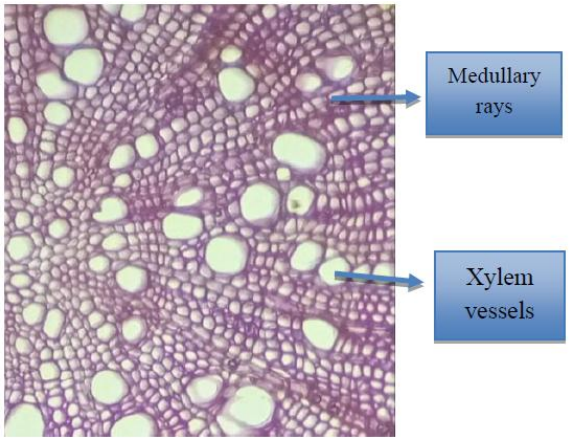

Fig. 3. T.S of root stained with Phloroglucinol-HCl and observed under magnification 10 X.

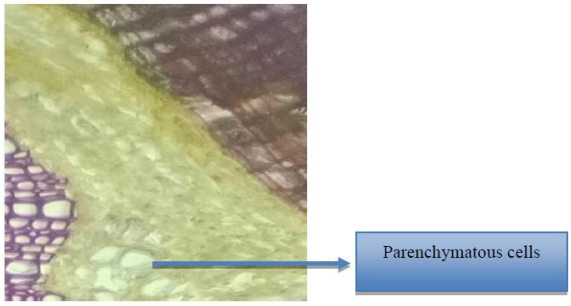

Fig.4. T.S of root stained with phloroglucinol-HCl and observed under magnification 10X

Powder Microscopy

Powder microscopy of the roots of *Alstoniascholaris*(L.)R.Br. showed the presence of xylem vessels, pitted vessels, cork cells, phloem fibres and starch grains. The presence of these diagnostic powder characters is useful for the identification of the powdered crude drug and for the detection of adulteration.

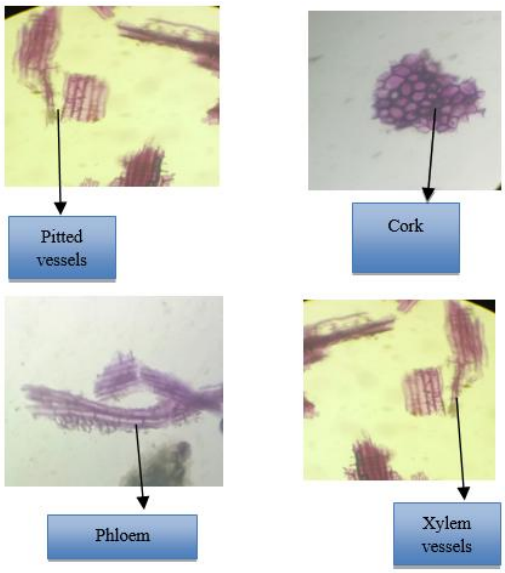

Fig.5.Powder microscopy of *Alstoniascholaris* (L.)R.Br. root using Phloroglucinol-HCl and observed under magnification10X

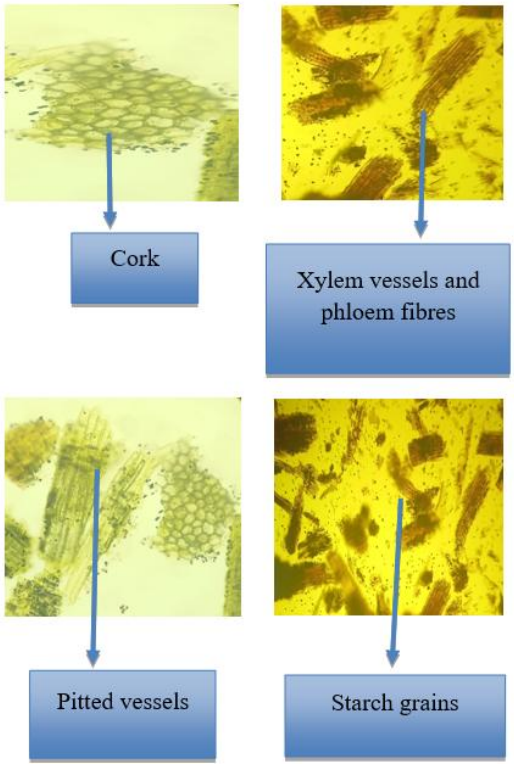

Fig.6. Powder microscopy of *Alstoniascholaris* (L.)R.Br. using iodine as staining reagent and observed under magnification 10X.

International Journal of Pharmaceutical research and Applications
Volume 11, Issue 3, May-June2026, pp:2033-2037 www.ijprajournal.com ISSN:2456-4494

Determination of Physicochemical Parameters

The physicochemical constants of the powdered root drug were determined using standard procedures and the results are presented in Table 2. These values are useful for the assessment of quality, purity and identity of the crude drug.

Table 2. Physicochemical parameters of root powder of*Alstoniascholaris*(L.)R.Br.

Parameter	Result (% w/w)
Loss on drying	7.4± 0.0166
Total ash	1.5 ± 0.0295
Acid-insoluble ash	0.166 ± 0.0175
Water-soluble ash	0.2 ± 0.0128
Sulphated ash	4.75 ± 0.03
Alcohol-soluble extractive value	10.59 ± 0.096
Water-soluble extractive value	6.42 ± 0.0267
Ether-soluble extractive value	5.01 ± 0.008
Crude fiber content	15.1 ± 0.07

The drug was standardised by doing Ash values, Extractive values, Loss on drying and Crude Fiber Content. The physical constants such as total ash value (1.5 ± 0.0295 % w/w), acid insoluble ash value (0.166 ± 0.0175 % w/w), water soluble ash value (0.2 ± 0.0128 % w/w), sulphated ash value (4.75 ± 0.03 %w/w) and extractive values with solvents such as ether, ethanol and water were 5.01 ± 0.008 % w/w, 10.59 ± 0.096 % w/w, 6.42 ± 0.0267 % w/w respectively indicate the nature of constituents present.

The values obtained for ash and extractive parameters may serve as useful reference standards for future identification and quality control studies of the root drug. All the values are within thepermissible limitsas per general quality control standards.

Table 3. The detection of inorganic constituents present in the ash of *Alstoniascholaris* (L.)R.Br. root powder

SL. NO	EXPERIMENT	INFERENCE
1	Test for Nitrates	Absent
2	Test for carbonates	Present
3	Test for chlorides	Absent
4	Test for sulphates	Present
5	Test for iron	Present
6	Test for calcium	Present
7	Test for phosphates	Present

Fluorescence Analysis

Table 4. Fluorescence analysis of root powder of *Alstoniascholaris* (L.)R.Br.

Treatment	Day light	UV 254 nm	UV 365 nm
Powder as such	Creamy white	Green	Pale blue
Powder + 1N HCl	Creamy white	Green	Green fluorescence
Powder + 1N HNO_3	Creamy white	Pale greenish yellow	Yellow fluorescence
Powder + 1N NaOH	Light brown	Dark green	Brown
Powder + HNO_3	Reddish brown	Brown	Black
Powder + H_2SO_4	Dark	Reddish brown	Dark
Powder + HCl	Brown	Green	Brown
Powder + acetic acid	Light brown	Green	Yellow fluorescence
Powder + Ammonia	Yellow	Green	Green fluorescence
Powder + ethanol	Creamy white	Green	Green fluorescence
Powder + picric acid	Yellow	Green	Dark brown
Powder + acetone	Creamy white	Green	Pale green
Powder + 5 % ferric chloride	Light brown	Greenish brown	Greenish black
Powder + alcoholic KOH	Brown	Green	Green fluorescence
Powder +5%Na_2CO_3	Brown	Green	Green fluorescence

Fluorescence characteristics of the powdered drug may serve as an additional tool for the identification and standardization of the crude drug. It also serve as a chemical fingerprint helpful for the identification of the crude drug. Green fluorescence is associated with presence of indole

International Journal of Pharmaceutical research and Applications
Volume 11, Issue 3, May-June2026, pp:2033-2037 www.ijprajournal.com ISSN:2456-4494

alkaloids. Yellow fluorescence is associated with the presence of flavonoids. These compounds may be present in the root powder and may contribute to the therapeutic activity of the plant.

IV. CONCLUSION

Alstoniascholaris(L.)R.Br. is a widely used medicinal plant used to treat various ailments, but not much studies are conducted in the roots of this plant still claiming the traditional uses.

The macroscopic and microscopic features were observed and documented.The transverse section of the root showed the characteristic anatomical features of the crude drug such as cortex, cork, parenchymatous cells, vascular bundles (xylem and phloem), pith and medullary rays. The powder microscopy revealed the presence of xylem vessels, pitted vessels, cork cells, phloem fibers and starch grains.

Physicochemical parameters : The drug was standardised by doing Ash values, Extractive values, Loss on drying and Crude Fiber Content.

The fluorescence studies of the powder showed the presence of green fluorescence with 1N HCl, alcoholic KOH, ethanol, Dil. NH_3 and Na_2CO_3 and yellow fluorescence with 1N HNO_3 and acetic acid.

The results from these studies can be used for setting standards and quality control profile for *Alstoniascholaris*(L.) R.Br. roots.These studies can contribute a promising drug molecule for the world for the well being of mankind.

REFERENCES

[1]. Khyade MS, Vaikos NP. Phytochemical and antibacterial mproperties of leaves of *Alstoniascholaris* R. Br. Afr J Biotechnol. 2009;8(22):6434-6436.

[2]. 2.Khyade MS, Kasote DM, Vaikos NP. *Alstoniascholaris* (L.) R. Br. and Alstonia macrophylla Wall. ex G. Don: A comparative review on traditional uses, phytochemistry and pharmacology. J Ethnopharmacol. 2014;153(1):1–18.

[3]. Chaudhary R. Ethnopharmacological review on versatile herbal medicament *Alstoniascholaris*. InnovPharmacother. 2022;10(2):1-7.

[4]. Shang JH, Cai XH, Feng T, et al. Pharmacological evaluation of *Alstoniascholaris*: anti-tussive, anti-asthmatic and expectorant activities. J Ethnopharmacol. 2010;129(3):293–298.

[5]. Baliga MS. Review of the phytochemical, pharmacological and toxicological properties of *Alstoniascholaris* Linn. R. Br. Chin J Integr Med. 2012;18(6):423–436.

[6]. KhandelwalKR.Practical Pharmacognosy: Techniques and Experiments. 19th ed. Pune: Pragati Books Pvt. Ltd.; 2008. p. 149–156.

[7]. Kokate CK, Practical Pharmacognosy. 4th ed. Delhi: Vallabh Prakashan; 1994. p. 1-9..

[8]. Mukharjee PK. Quality control of herbal drugs- an approach to evaluation of botanicals 31 st edition. New Delhi.Business Horizons Pharmaceuticals. Publications. 2019;85-94.

[9]. Pharmacopoeia. Indian drug manufacturers Association. Revised edition. Mumbai : Indian Herbal Pharmaacopoeia. 2002;493-494.

[10]. Kokashi CJ, Kokashi RJ, Sharma M. Fluorescence of powdered vegetable drugs in ultra violet radiation. Journal of the American Pharmacist Association 1958; 47 : 715-717.