WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.453
Volume 13, Issue 13, XXX-XXX. Research Article ISSN 2277–7105

PHYSICOCHEMICAL ANALYSIS OF ANDROGRAPHIS PANICULATA (BURM.F.) WALL.EX NEES (KALMEGH) WHOLE PLANT

Dr. Piyusha V. Sarode[1]* and Dr. Surekha T. Landge[2]

[1]MD 3rd year (Dravyaguna) Shri Ayurved Mahavidyalaya, Nagpur, Maharashtra, India.

[2]M.D. (Dravyaguna), Assistant Professor and HOD (Dravayguna), Shri Ayurved Mahavidyalaya, Nagpur, Maharashtra, India.

Article Received on
21 June 2024,

Revised on 11 July 2024,
Accepted on 31 July 2024

DOI: 10.20959/wjpr202413-33363

***Corresponding Author**
Dr. Piyusha. V. Sarode
MD 3rd year (Dravyaguna)
Shri Ayurved
Mahavidyalaya, Nagpur,
Maharashtra, India.
piyusarod1997@gmail.com

ABSTRACT

The Ayurvedic system of medicine is one of the world's oldest holistic healing systems. It was developed more than 3,000 years ago. This medicinal system incorporates the use of Dravya's medicinal plants, which proved to be an effective means of human care. one among many such a plant is *kalmegh. Andrographis paniculata* (*Burm.f.) Wall.ex Nees*, generally known as "king of bitters," is an herbaceous plant in the family Acanthaceae. This plant has been widely used in treating *Ajirna, Atisara, Jvara, Kandu, Kamala.* All parts of *A paniculata* are extremely bitter in taste. The present study was carried out to investigate the morphological, microscopical, and physicochemical screening of Andrographis paniculata (whole plant). Physicochemical properties, including loss on drying, total ash value, a water-soluble extractive, and alcohol-soluble extractive, were determined. The microscopic study of powdered Dravya was done. This observation could be considered a reference standard for future studies.

KEYWORDS: *Andrographis paniculata*, physicochemical investigation, pharmacognostic standardisation, *kalmegh.*

INTRODUCTION

Ayurveda is one of the ancient medicinal sciences. It is made up of two words: Ayur (life) and Veda (science or knowledge), so collectively it means "the science of medicinal herbs, plants, and trees play a key role in ayurvedic forms of treatment; it involves the use of plants or parts of plants to treat injuries and illnesses. Since time immemorial, the crucial authority of herbal

medicine in serving the therapeutic requirements of the population worldwide needs no evidence; nearly 80% of the global population still depends upon herbal drugs for their health care.[1]

Andrographis paniculata (*Kalmegh)* is an herbaceous plant in the family Acanthaceae, local to India and Sri Lanka. The plant is famous in northeastern India as *Maha-tita, means* "king of bitters." As an Ayurveda herb, it is known as *Kalmegh* or *Kalamegha*, meaning "dark cloud." It is also known as *Bhui-neem*, meaning "neem of the ground," since the plant, though a small annual herb, has a similar strong bitter taste as that of the large Neem tree *(Azadirachta indica*).[2] As per The Indian Pharmacopoeia, it is a chief constituent of at least 26 Ayurvedic formulations.[3]

Ayurvedic properties of action and Pharmacological properties of Kalmegh[5,9]

Ayurvedic properties	Therapeutic Usage	Pharmacological properties
Rasa: Tikta Guna: Laghu, Ruksha. Vipaka: Katu; Virya: Sheeta Karma: Deepan, Jwarghna, Krimighna and Kapha pitthara.	Arsh, Atisar, Jwar, Kandu, Kamla, Kustha, Prameha, Yakritvikar and Twakvikara.	Anti-inflammatory, antioxidant, antidiabetic, anti-leishmanial, anti- diarrhoeal and intestinal effects and antifertility activity
Important Formulation: Kalmeghasav		

AIM AND OBJECTIVES

1) To evaluate the macroscopic characters of the whole plant of *Andrographis paniculata (Burm.f.) wall.ex Nees* by organoleptic methods.
2) To study the microscopic characters of the whole plant of *Andrographis paniculata (Burm.f.) wall.ex Nees.*

MATERIAL AND METHODS

A) Collection of plant material- sample of *Andrographis paniculata (Burm.f.) wall.ex Nees* were collected from the departmental medicinal plant garden of Shri ayurvedic Mahavidyalaya, Nagpur, Maharashtra.

B) Plant material -whole plant was dried in a shed and ground to a coarse powder.

C) Pharmacognostical Study- [4] The pharmacognostic study of the sample for macroscopic and microscopic characters was carried out at the central research laboratory of Shri Ayurved Mahavidyalaya.

1) Macroscopic study: The cut sections of the whole plant of *Kalmegh* were spread on clean,

dry plastic sheets and were separately investigated for different organoleptic features by using sense organs; colour, odour, taste, texture, size and shape, were noted.

2) Microscopic study: A few milligrams of powder should be warmed with chloral hydrate over a water bath, then cleaned and a small portion mounted in glycerine; a few milligrams should be treated with iodine in potassium iodide solution and mounted in glycerine; a few milligrams should be treated with phloroglucinol solution, allowed to dry, and then a few drops of hydrochloric acid should be added and mounted in glycerine.

Physicochemical study[7]

The physical standards help in the assessment of crude drugs. These are rarely constant, but they help in the evaluation of drugs. The Quality of the drug can be assessed with this analysis, and thus biochemical variation, adulteration, substitution and the effect of storage or treatment occurring in it can be tested.

a) foreign matter

The sample shall be free from visible signs of contamination i.e. moulds, insects, stones, other animals, contamination, fungus, and any other noxious foreign matter. For this, take a 100gram sample and spread it in a thin layer on a suitable tray. Then examine in daylight with unaided eye.

b) Loss on drying

It helps to determine the amount of volatile matter (i.e. water drying off from the drug) for substances appearing to contain water as the only volatile constituent.

For this, 2grams of drug were accurately weighed. Then sample was placed in Pooling for 105° C temperature for two hours. It was removed, placed in desiccator for cooling for half hour and weighed.

c) Total ash value

The residue remaining after incineration is the ash content of the drug, which simply represents inorganic salts, either naturally occurring in the drug or adhering to it or deliberately added to it, as a form of adulteration.

The total ash value was obtained by accurately weighing 2 grams of the dried plant material in a silica dish which was ignited with Bunsen burner for about an hour. The ignition was completed by keeping it in a muffle furnace at 550 °C till grey ash formed. It was then cooled

in a desiccator and weighed.

d) Water soluble extractive

Macerate 5g of the air-dried drug, coarsely powdered, with 2.5 ml chloroform in purified water to produce 1000 ml of specified strength in a closed flask for 24 hours, shaking frequently during 6 hours, and allowing to stand for 18 hours. Filter rapidly, taking precautions against loss of solvent evaporate 25 ml of the filtrate to dryness in a tared flat bottomed shallow dish, and dry at 105 degrees to constant a weight and weigh. Calculate the percentage of water-soluble extractive with reference to the air-dried drug.

e) Alcohol soluble extractive

Macerate 5g of the air-dried drug, coarsely powdered, with 100 ml of alcohol of specified strength in a closed flask for 24 hours, shaking frequently during 6 hours and allow to stand for 18 hours. Filter rapidly, taking precautions against loss of solvent, evaporate 25 ml of the filtrate to dryness in a tared flat bottomed shallow dish and dry at 105degree to constant weight and weigh. Calculate the percentage of alcohol soluble extractive with reference to the air-dried drug.

d) Determination of pH

The pH value of an aqueous solution is defined as the common logarithm of the hydrogen ion concentration expressed in grams. The pH value conventionally represents the acidity or alkalinity of an aqueous solution.

About 1.25 g of sample were weighed and transferred to a clean conical flask. 25 ml of distilled water was added to it and shaken continuously with the help of a clean and dry glass rod for 45 minutes. It was then filtered with the help of filter paper so as to remove the insoluble portion. The pH value was found from pH meter by calibrating it previously with standard buffer solution of pH 4. The 7.5 pH electrode was dipped in the above standard solution, and readings were noted.

OBSERVATION AND RESULTS

Based on the Pharmacognostical, Phytochemical study done of the sample of whole plant of *A. paniculata (Burm.f.) wall.ex Nees* following observations were made and results were obtained.

1) Microscopic study - bits of helical, pitted, scalariform, and acicular fibres from the stem's

xylem area; a few thin-walled, striated corks seen in section; pieces of epidermis with several diacytic stomata; parenchymatous pith cells with tiny acicular crystals of calcium oxalate and starch grains up to 8µ; Numerous cystoliths; short and long trichomes that are uni, bi, and tricellular; glandular trichomes that are short and long and have a multicellular stalk and head; fibre and sclereid fragments; a few oval to spherical-shaped pollen grains.

2) Organoleptic characters of the Obtained Sample of the whole plant of *Andrographis paniculata (Burm.f.) wall.ex Nees* on the basis of observations are given in Table 1.

Sr. No	Macroscopic characters	Observation
1	External colour	Leaves: dark green; flowers: rose coloured
2	Size	Leaves: 7*2.5cm; flowers:1.8cm length
3	Shape	Leaves: lanceolate and petiolate
4	Odour	odourless
5	Taste	Intensely bitter

Table 2: Physicochemical study of obtained sample of the whole plant of *Andrographis paniculata (Burm.f.) Wall.ex Nees* on the basis of observation given in Table 2.

Sr. No	Parameters	Values obtained (%W/W)
1.	Foreign matter	1.34
2.	Loss on drying	10.1
3.	Total ash value	13.71
4.	Alcohol soluble extractive	0.96
5.	Water soluble extractive	30.21
6.	pH value	7.95

DISCUSSION

In study we have done, Our investigation revealed that the organoleptic features of the dried whole plant of *Andrographis paniculata (Burm.f) Wall. ex Nees* revealed that the flowers were violet streak and tubular-shaped, the stem and leaves were dark green; the odour was characteristic; the taste was strongly bitter; and the texture of the stem was slightly coarse. The microscopic characteristics study revealed the presence of parenchymatic cells, lignified fibres, nitrogenous compounds, starch, scleroids and trichome.

In a physicochemical study, the loss on drying of any sample is directly related to its moisture content, and if the moisture content is high, the chances of contamination and decomposition of crude drugs increase. Hence, the loss on drying of the sample was found to be 10.1 for the whole plant. The residue remaining after incineration is the ash content of the drug; it represents inorganic salts, either naturally occurring in the drug or adhering to it or deliberately added to it, as a form of adulteration. The Ash value was found to be 13.71 for

the whole plant. Water-soluble and alcohol-soluble extractive values are indicative of the bioavailability of the plant compounds in the extracts. The Values obtained W.S.E.and A.S.E. were 0.96 and 30.2, respectively. These values reveal that whole plants show the presence of chemical constituents available in their extracts. The pH of the water extract of the sample of *Kalmegh* whole plant showed that it is acidic in nature.

Hence, through organoleptic characteristics, microscopic observations and observations of section cutting provide the basis for the identification, and process standardization can be achieved.

CONCLUSION

The authenticity of the raw material was established based on organoleptic characteristics and microscopic observations obtained during the study. The values of the physicochemical parameters for the whole plant of *A. paniculata* are noted down and will be beneficial for further work done in this field.

The study lays the groundwork for setting standards for crude drugs, as the physical constant evaluation is an important parameter in detecting adulteration or improper handling of drugs and it will help further drug discovery and development.

REFRENCES

1. Bent s, Kor, Commonly Used Herbal Medicine in The united states: A review American Journal of medicinal genetics, 2004; 116: 478.
2. Kumar, A Dora, J Singh, & Tripathi, R. A review of king of bitter (Kalmegh) International Journal of Respiratory Pharmacology, Chem., 2012; 2(1): 116-124.
3. Mishra, S. K.Sangwan, N. S., & Sangwan, R.S. Pharmacognosy Reviews: Plant Review Andrographis paniculata (Kalmegh), 2007; 1(2): 283-298.
4. The Ayurvedic Pharmacopoeia of India, Part-I, Vol 8 Ministry of Health and Family Welfare, Government of India, New Delhi, Controller of Publication Civil Lines, 1st Edition, Print, 2011; 106.
5. P.V. Sharma, Dravyaguna Vigyan vol-II, reprint edition, Chaukhambha Bharti Academy, Varanasi, 2021; 544-545.
6. Kunle, Folashade O, Egharevba, Omoregie Henry, Ahmadu, Ochogu Peter, International Journal of Biodiversity and Conservation, 2012; (3): 101-112.
7. C. K. Kokate, Pharmacognosy, Analytical Pharmacognosy Nirali Prakashan, Dec 2010;

46, 1, 2: 8.97, 8.98.

8. C.K. Kokate, Pharmacognosy, Vol.I, Analytical Pharmacognosy, Edition forty sixth, Nirali Prakashan, Pune, Dec 2010; 6.18-6.22.
9. Niranjan, A., Tewari, S.K., & Lehri, A, Biological Activities of Kalmegh (Andrographis paniculata) and its Active Principles: A Review, 2010; 1(2): 125-135.