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PHARMACOGNOSTIC AND PHYTOCHEMICAL ESTIMATION OF *ANDROGRAPHIS PANICULATA LEAF* AND STEM.

Ayurveda

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ABSTRACT

Andrographis paniculata (Asclepiadaceae) is native to India. Leaves of *Andrographis paniculata* is a best remedy for diabetes. Pharmacognostic standardization, physicochemical evaluation of the Leaves of *Andrographis paniculata* was carried out to determine its macro-and microscopical characters and also some insoluble ash and sulphated ash values, alcohol- and water-soluble extractive values were determined for phytochemical evaluations. Preliminary phytochemical screening was also done to detect different phytoconstituents. Microscopically, leaves showed The Proximate analysis of powder was also carried out in which extractive value, ash value, foreign matter, moisture content, loss on drying and foaming index were determined and also successive solvent extraction was carried out using soxhlet extractor in which ethanol was used. Aqueous extract was also carried out by maceration method. Preliminary phytochemical screening of various successive extracts of leaves was done qualitatively which revealed the presence of anthraquinones, saponins, flavonoids, phenolic compounds, alkaloids, carbohydrates and tannins.

KEYWORDS:

Andrographis paniculata, macroscopy, microscopy, phytoconstituents

1. INTRODUCTION

Andrographis paniculata which is popularly known as kariyatu widely used as antidiabetic. Kalmegh is also used in hepatoprotective, febrifuge, bitter tonic, blood purifier, in bacillary dysentery, dyspepsia, for loss of appetite, anthelmintic, alternative, antispasmodic, in diabetes, piles, bronchitis, debility, influenza, as an astringent, has anodyne property [1]. Literature revealed that pharmacognostic studies have not been reported for the leaves of this plant. Therefore the main aim of the present work is to study the macro, microscopic and some other pharmacognostic characters and physic-chemical standards of leaves of *Andrographis paniculata* which could be used to authentify this plant.

2. MATERIALS AND METHODS

2.1 Collection of Plant Material

Fresh sample of *Andrographis paniculata* for its standardization was collected from the medicinal and aromatic plants centre, Anand. These were identified and authenticated on the basis of their various morphological as well as microscopical characters. Herbarium specimen was submitted to the Department of Pharmacognosy, A. R. College of Pharmacy, Vallabh Vidyanagar. The ID number was given SHK/Ap-1/1/ARGH-11.

2.2 Pharmacognostic evaluation

2.2.1 Macroscopy

Macroscopic evaluation of the fresh plant of *Andrographis paniculata* was done and identified by comparing their morphological characters mentioned in the literature. Result is shown in figure 1

2.2.2 Microscopy

Pharmacognostical evaluation including histochemical study was carried out by taking free-hand sections according to Wallis and powder studies according to Evans. The section was stained with pholoroglucinol- hydrochloric (1:1) solution and mounted in glycerin [2,3]. Powder (Sieve mesh 60 of the dried leaves was used for the observation of powder microscopical character [4]. The powdered drug was separately treated with pholoroglucinol- hydrochloric (1:1) solution. Photomicrographs were obtained by observing free-hand sections of drug under compound binocular microscope. Results are shown in figure 2.

2.2.3 Physico-chemical evaluations

Proximate analysis aids to set up certain standard for dried crude drugs in order to avoid batch-to-batch variation and also to judge their quality. Their studies also give an idea regarding the nature of phytoconstituents present. Proximate analysis of the crude drug powder was carried out using methods prescribed in the Ayurvedic pharmacopoeia of India by subjecting them to various determinations like total ash, water-soluble ash, acid-insoluble ash, and sulphated ash values, determination foreign matter and PH, loss on drying, Alcohol and water-soluble extractive values were determined to find out the amount of water and alcohol soluble components [4,5]. The moisture content was also determined. Results are shown in table no. 1

2.3 PHYTOCHEMICALANALYSIS:

2.3.1Preliminary phytochemical screening

The dried powdered plant material was successively extracted 70% v/v alcohol in a Soxhlet apparatus. Aqueous extracts were also prepared by using chloroform water I.P. by maceration process. The liquid extracts obtained with different solvents were collected and the consistency, color, appearance of the dried extracts and their percentage yield were noted. The extracts obtained from powder by successive solvent extraction were subjected to qualitative examination for the phytoconstituents like alkaloids, glycosides, carbohydrates, phytosterols, fixed oils, saponins, phenolic compounds, tannins and flavonoids, proteins and amino acids by the reported methods [9]. Results are shown in table no. 2 & 3

3. RESULT AND DISCUSSION

3.1 Macroscopy

Leaves were having size of 6-7 cm in length, 1.5-2.5 cm wide, lanceolate, glabrous, pale beneath, base tapering, acute apex, entire margin, petiolate leaf and green in color

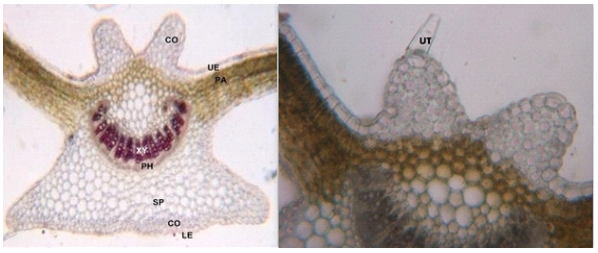
Figure 1: Morphology of *A. paniculata* plant

3.2 Microscopy

3.2.1 Transverse section of leaf

Transverse section of leaf was taken at midrib portion. Lamina is

dorsiventral type, differentiated into palisade and spongy parenchyma. Here palisade layer is not continuous so it is transcurrent type of leaf. Upper and lower epidermis is covered with cuticle having 1-3 celled covering trichomes. Glandular trichomes with multicellular head are present. Below the epidermis is a single layer of palisade cells followed by 2-3 layered spongy parenchyma. Midrib region shows 2-4 layers of collenchymatous cells. Stomata is of diacytic type only on the lower surface. There is an arc shaped vascular bundle in the centre. Each vascular bundle is collateral and closed. Acicular crystals of calcium oxalate are present.

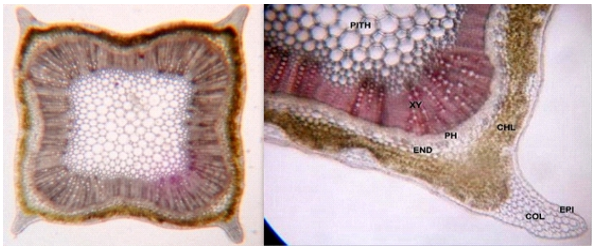


CO- Collenchyma, UE- Upper epidermis, PA- Palisade layer, XY- Xylem, PH- Phloem, SP- Spongy Parenchyma, LE- Lower Epidermis

Figure 2: Microscopical view of *A. paniculata* leaf

3.2.1 Transverse section of stem

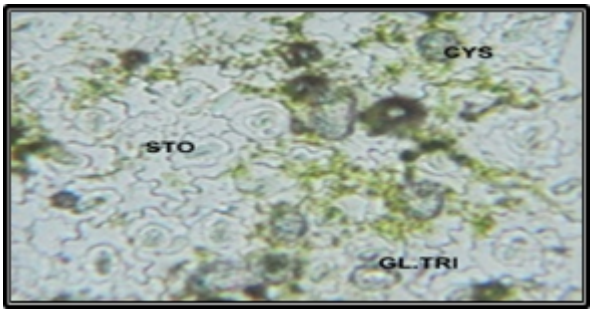
A Transverse Section of stem of *Andrographis paniculata* is square in outline having bulges at the corners. Multicellular covering and glandular trichomes are present. There is a single layer of epidermis covered with cuticle. Collenchymatous cells are present at the corners. Alternate layers of chlorenchyma and collenchyma are present the below epidermis. Then is the endodermis. Below it is phloem and then xylem. Inner to xylem, parenchymatous pith is present. Acicular crystals of calcium oxalate are present.



CO- Collenchyma, UE- Upper epidermis, PA- Palisade layer, XY- Xylem, PH- Phloem, SP- Spongy Parenchyma, LE- Lower Epidermis

Figure 3: Microscopical view of *A. paniculata* stem

3.2.3 Surface preparation of *A. paniculata* leaf



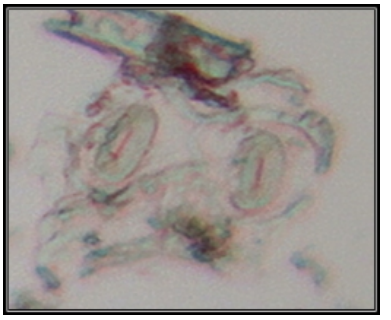
CYS- Cystolith, STO- stomata, GL.TRI- Glandular trichome

Figure 3: Paracytic stomata in lower surface

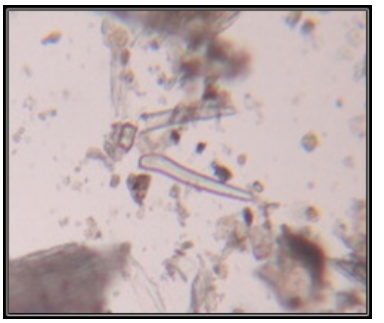
3.2.4 Powder microscopy of dried powder of *A. paniculata*

The powder of was greenish yellow, without characteristic odor and with slightly bitter taste.

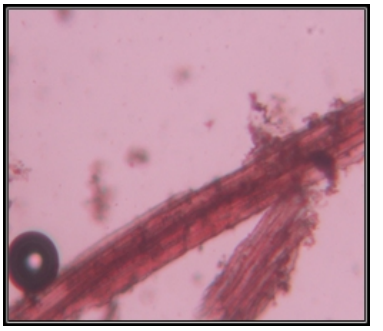
When powder was mounted with chloral hydrate, phloroglucinol and HCl the following elements were observed:



A] Diacytic stomata



B] Covering trichome



C] Lignified xylem fibre

Figure 4: powder study of leaves of *Andrographis paniculata*

3.2.4 Physico-chemical evaluations

Table 1: Physico-chemical evaluations of plant *Andrographis paniculata*

Sr. no.	Parameter	Result
1.	Total Ash	14.3
2.	Acid Insoluble Ash	1.2
3.	Water Soluble Ash	1.89
4.	Alcohol Extractive Value	10.4
5.	Water Extractive Value	21.31
6.	Moisture content	5.9

W/W- weight/weight; Total ash is approximately 12 times more than acid insoluble ash, respectively. Alcohol soluble extractive value is approximately 9 times higher than water soluble extractive value.

3.3PHYTOCHEMICALANALYSIS:

3.3.1 Preliminary profiles of Successive solvent extracts

The powder of *Andrographis paniculata* were extracted with ethanol by soxhlet apparatus. The results are described in Table no. 2

Table 2: Preliminary profiles of Successive solvent extracts

Sr. No.	Extract	Color in day light	Consistency	% w/w
1	Ethanol	Dark brown	Semi solid	16 % w/w

3.3.2 Preliminary phytochemical screening:

All the above extracts were tested with various reagents and the results for the same are reported in table no.3. The various extracts showed the

presence of phytosterol, triterpenoids, saponins, flavonoids, phenolic compounds, alkaloids, carbohydrates and tannins.

Table 3: Phytochemical Screening

Sr. No.	Constituents	Ethanol
1.	Phytosterol	+
2.	Triterpenoids	+
3.	Anthraquinones	-
4.	Tannins and phenolics	+
5.	Carbohydrates	+
6.	Fixed oils	+
7.	Vitamins	+
8.	Flavonoids	+
9.	Alkaloids	+
10.	Saponin	+

CONCLUSION

Macroscopic and microscopic evaluation could be used in deciding the genuineness of the herb, irrespective of their collection from different sources. The colored photographs of the leaves of the above revealed plant might enable the researcher for identification. The results of the phytochemical screening can be considered as characteristic parameters to recognize and decide the authenticity of *Andrographis paniculata* and thus can be used as standards for reference purpose also. The outcome of the quantitative parameters described on the above-mentioned plant parts might be useful in determining the authenticity of the drugs.

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