Int J Pharm Bio Sci 2016 Jan; 7(1): (P) 40 - 44

Research Article **Pharmacognosy**

International Journal of Pharma and Bio Sciences **ISSN 0975-6299**

PHARMACOGNOSTIC AND PHYSICOCHEMICAL EVALUATION OF *SOLANUM VIRGINIANUM* L LEAVES (SOLANACEAE)

S. SUNDAR*[1] AND Y. JUSTIN KOIL PILLAI[2]

*[1]*Research Scholar, Faculty of Bio-Engineering, Sathyabama University, Chennai, Tamilnadu-600119, India.*
[2]*Department of Botany, St' Joseph's College (Autonomous), Tiruchirappalli, Tamilnadu- 620002, India.*

ABSTRACT

The whole plant of *Solanum virginianum* L is reported to have great medicinal value. It is found effectively treating worms, cold, fever, hepatomegaly, muscular pain, urinary stones, etc. Nasal administration is beneficial in migraine, asthma and headache. The present investigation was therefore undertaken to evaluate the requisite pharmacognostical standards by studying macroscopic and microscopic characters for the leaf material of *Solanum virginianum* L. The physicochemical properties such as loss on drying (5.6%), total ash value (13.54%), acid insoluble ash value (4.25%), water soluble ash value (12.35%), alcohol soluble extractive value (8.5%), water soluble extractive value (23%) and petroleum ether soluble extractive value (4.2%) were carried out. The fluorescent analysis was carried out by using different chemicals. These studies provided crucial information for the correct identification and standardization of this leaf material. Further studies could also be carried out to characterize and screen the valuable compounds present in the leaves of this plant.

KEYWORDS: *Solanum virginianum* **L, Microscopy, Pharmacognosy, Physicochemical.**

S. SUNDAR
Research Scholar, Faculty of Bio-Engineering,
Sathyabama University, Chennai, Tamilnadu-600119, India

***Corresponding author**

INTRODUCTION

Medicinal plants have been a major source of cures for human diseases since time immemorial. It is no wonder that the world's one-fourth populations, i.e. 1.42 billion people, are dependent on traditional medicines for the treatment of various ailments[1]. According to the World Health Organization, the macroscopic and microscopic description of a medicinal plant is the first step towards establishing the identity and the degree of purity of such materials and should be carried out before any tests are undertaken. Ancient Indian literature incorporates a remarkably broad definition of medicinal plants and considers all plant parts to be potential sources of medicinal substances[2]. However, a key obstacle, which has hindered the acceptance of the alternative medicines in the developed countries, due to the lack of documentation and stringent quality control. There is a great need for documentation of research work carried out on traditional medicines[3]. With this backdrop, it becomes extremely important to make an effort towards standardization of the plant material to be used as medicine. The standardization of plants can be achieved by stepwise Pharmacognostic studies[4]. Pharmacognostical studies greatly help herbalists in the correct identification of the crude drugs and also in the preparation of commercially viable phytodrugs[5]. Correct identification and quality assurance of the starting materials is an essential prerequisite to ensure reproductive quality of the herbal medicine which will contribute to its safety and efficacy[6]. Simple Pharmacognostic techniques used in standardization of plant material include its anatomical, morphological and biochemical characteristics. These studies help in identification and authentication of the plant material. *Solanum virginianum* L is a highly important medicinal value plant. It has been used traditionally in worms cold, fever, migraine, headache, dental infections, cough, and pain in chest, reduces the pain and swelling in arthritis. Chronic bronchitis[7], cough[8], cardiac stimulant,expectorant[9]. Use for catarrhal fever and pain in the chest. After decades of serious obsession with the modern medical system, people have started looking at the ancient healing systems like Ayurveda, Siddha and Unani to avoid side effects of synthetic drugs. Herbal medicine plays a very important role in the health care programs, significantly in developing countries.

MATERIALS AND METHODS

Collection and Identification of Plant material

The plant material, *Solanum virginianum* L was collected from a locality in Hyderabad (Andhra Pradesh). The sample was authenticated by Botanical Survey of India (BSI), Ministry of environmental & forests, Zoological survey of India campus, Hyderabad and voucher No-BSI/DRC/12-13/Tech/115. Fresh leaves and leaf powder were used in this present investigation to study the physicochemical and microscopic characters. The fresh leaves were collected and fixed immediately using FAA (Formalin: Acetic acid: Ethyl alcohol) as fixative agent for anatomical studies. After authentication of the leaves were washed, shade dried and ground in a mechanical grinder to obtained coarse powder for extraction. In spite of the numerous medicinal uses attributed to the plant, Pharmacognosy information about this plant has not been published. Hence the present investigation is the attempt in this direction, including the determination of fluorescence analysis, physicochemical analysis, macroscopic and microscopic characters of the leaf of *Solanum virginianum* L under the World Health Organization (WHO) guidelines[10].

Pharmacognostic Studies

Macroscopy of Leaf

Solanum virginianum L belongs to Solanaceae family. It is commonly known as thorny nightshade, yellow berried night shade. Leaves are unequal paired, the shape of the leaf blade is ovate-oblong, apex is acute and the margin is 5-9 lobed. The size of the leaf is 4 to 9 × 2 to 4.5 cm, usually green to brown in color and bitter in taste.

Microscopy of Leaf

Sections were manually obtained by sectioning with a razor blade. The sections were cleared for some minutes in sodium hypochlorite solution. It was washed with water and then stained with Toluidine blue. These were mounted on a slide with glycerol and edges were ringed with nail vanish to prevent dehydration. All Slides were observed under a light microscope and photomicrograph taken using Leica CM E microscope with Digital Microscope Eyepiece attachment and Photo Explorer 8.0 SE Basic software.

Powder analysis with Chemical Agents

The *Solanum virginianum* leaf powder was treated with different chemical reagents and the changes in powder characters were recorded.

The Fluorescence analysis of the Leaf Powder

Fluorescence is an important phenomenon exhibited by various chemical constituents present in plant material. The fluorescence color is specific for each compound. Some constituents show fluorescence in the visible range in daylight. The ultraviolet light produces fluorescence in many natural products which is not visible in daylight. If the substances themselves are not fluorescent, they will usually be regenerate into fluorescent derivatives after reacting with different reagents hence some crude drugs are often assessed qualitatively in this way and it is an important parameter of pharmacognostical evaluation. The fluorescence characteristics of *Solanum virginianum* powdered drug were studied under the U.V light after treating with different chemical reagents[11, 12].

Physicochemical Analysis of the Leaf Powder

Determination of Total ash value

Weighed about 2 g of the powdered drug of *Solanum virginianum* in a crucible and kept the crucible with drugs in the muffle furnace and heat until all the carbon was burnt off. Cool in a desiccator, weighed the ash and

calculated the percentage of total ash with reference to the air dried sample of the crude drug.

Determination of Acid insoluble ash value
About 25 ml of hydrochloric acid was added to the crucible contains the total ash and boiled gently for 5 min. Filtered through an ash less filter paper; washed the residue twice with hot water. Ignited the crucible in a flame,cooled and weighed. It was heated gently until vapors cease to be evolved and then strongly until all carbon has been removed, cooled in a desiccator. The residue was weighed and calculated the acid- insoluble ash with reference to the air dried sample of the crude drug

Determination of water soluble ash value
This is determined in a similar way to acid insoluble ash, using 25 ml of water, in place of dilute hydrochloric acid.

Determination of Alcohol Soluble Extractive
Weighted about 5 g of the powdered drug and transferred into a 250 ml of conical flask with 100 ml of 90% alcohol, corked the flask and set aside for 24 h. It was shaking frequently (maceration) then filtered and transferred 25 ml of the filtrate to a weighed thin porcelain dish and evaporated to dryness on a water-bath. Finally, it was dried at 105 °C for 6 h in an oven. It was cooled in a desiccator and weighed. Calculated the percentage (w/w) of alcohol soluble extractive with reference to the air dried drug material.

Determination of Water Soluble Extractive
The steps are similar to those mentioned above, use chloroform water instead of alcohol.

Determination of Petroleum ether Soluble Extractive
The steps are similar to those mentioned above; use Petroleum ether instead of alcohol.

Determination of Moisture content (loss on drying)
A 2 g crude powder of *Solanum virginianum* was taken in previously dried and tarred flat weighing evaporating dish and then dried in an oven at 105 ºC till constant weight was obtained (up to three consecutive readings). The weight after drying was noted and the loss on drying was calculated. The percentage was calculated on the basis of sample taken initially.

RESULTS AND DISCUSSION

Microscopy of Leaf
Transverse section of Leaf through the midrib with lamina, T.S of midrib, Midrib with the vascular bundle show following characteristic and it was shown in Figure 1 and 2.

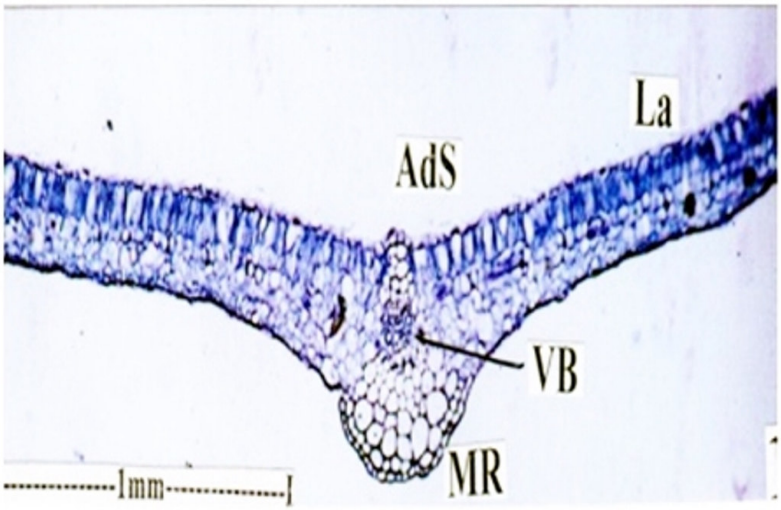

Figure 1
Transverse Section of Solanum virginianum L leaf through midrib with lamina at 4x
AdS –Adaxial Side, La –Lamina, VB- Vascular Bundle, MR- Mid Rib

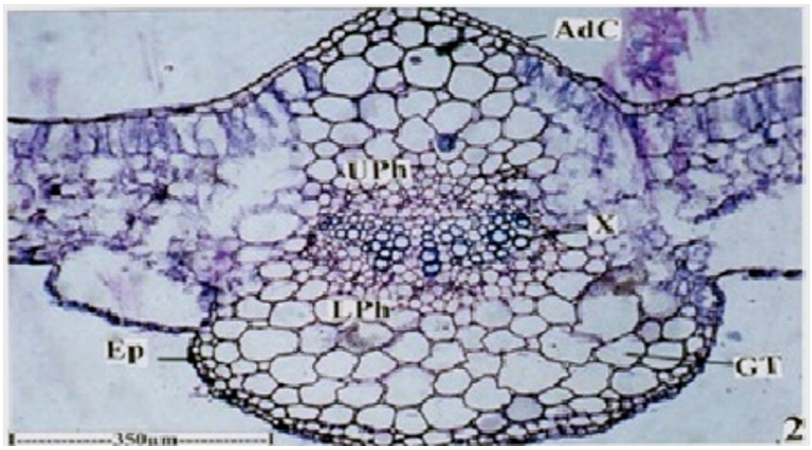

Figure 2
Transverse Section of Solanum virginianum L leaf midrib-magnified at 10x
AdC – Adaxial Cone, X –Xylem, GT- Ground Tissue, LPH- Lower Phloem, UPH- Upper phloem

- The lamina is 300 µm thick. It is dorsiventral with an adaxial band of palisade cells, a median line of spherical cells and abaxial zone of two or three spongy parenchyma cells
- The vascular bundle is simple, small and bicolateral. It consists of a few short parallel lines of thin walls angular Xylem elements. There are small clusters of phloem elements on the upper and lower portions of the xylem strand
- The leaf consists of abaxially semi-circular midrib and uniformly thin lamina.
- The ground tissue of the adaxial cone consists of fairly thick walled, angular, compact cells. The abaxial part has circulated, thin walled, less compact parenchyma cells.

Physicochemical Analysis of the Leaf Powder

Behavior pattern of powdered leaves of *Solanum virginianum* on treatment with different chemicals and Fluorescence characters of the plant powder under UV light (UV 366 nm) were determined and are tabulated in Table 1, 2.

Table I
Powder Analysis of Solanum virginianum L with Chemical reagents

S. No	Reagents	Color observed
1	Powder as such	Green
2	Powder + Conc. Hydrochloric acid	Blackish Green
3	Powder + Conc. Nitric acid	Light Yellow
4	Powder + Conc. Sulfuric acid	Brownish Yellow
5	Powder + Glacial acetic acid	Light brown
6	Powder + 5% Sodium hydroxide	Brownish Green
7	Powder + 5% Potassium hydroxide	Yellowish Green
8	Powder + 5% Ferric chloride	Blackish Brown
9	Powder + Picric acid	Yellow
10	Powder + Ammonia	Reddish brown

Table 2
The Fluorescence Analysis of the Solanum virginianum L Leaf Powder

S. No	Treatment with chemical reagents	Fluorescence Observed (366nm)
1	Powder as such	Green
2	Powder + 1N Sodium hydroxide in methanol	Deep Green
3	Powder + 1N Sodium hydroxide in water	Light Green
4	Powder + 50% Hydrochloric acid	Blackish green
5	Powder + 50% sulfuric acid	Light green
6	Powder + 50% Nitric acid	Green
7	Powder + Petroleum ether	Deep green
8	Powder + Chloroform	Dark Green
9	Powder + Picric acid	Yellowish Green
10	Powder + 5% Ferric chloride solution	Brownish Green
11	Powder + 5% Iodine solution	Reddish Brown
12	Powder + Methanol	Deep green
13	Powder + Nitric acid and ammonia	Light Green

Physico-chemical parameters of Solanum virginianum were determined and are tabulated in Table 3.

Table 3
Physicochemical Parameters of the Solanum virginianum L

S. No	Parameter	Values %w/w
1	Total ash value	13.54%
2	Acid insoluble ash value	04.25%
3	Water soluble ash value	12.35%
4	Alcohol soluble extractive	08.5%
5	Water soluble extractive	23.0%
6	Petroleum ether soluble extractive	04.2%
7	Loss on drying	05.6%

Pharmacognostic evaluation of *Mimusops elengi*'s bark and seed powder under UV light seed gives fluorescent green color after treating it with iodine and ferric chloride. Total ash content was highest in bark (12.5 %) as compared to seed (6.0 %). Water-soluble ash was more or less similar in both bark and seed[13]. The plant material can be identified from their adulterants on the basis of fluorescence study and used as a diagnostic tool for testing the adulteration. Ash values, extractive values can be used as a reliable aid for detecting adulteration. Establishing standards is an integral part of establishing the correct identity and quality of a crude drug. Before any drug will be included in the pharmacopoeia, these standards should be established. The majority of the knowledge on the identity, quality and purity of the plant material can be obtained from its microscopy and physicochemical parameters. As there is no record of Pharmacognostical work on the leaves of *Solanum virginianum* L.

CONCLUSION

The present work is undertaken to produce some Pharmacognostical standards. These studies also suggested that the observed Pharmacognostic and physicochemical parameters are of great value in quality control and formulation development. In conclusion of the current study could also be useful to supplement data with respect to its identification, standardization, and in carried out further research.

CONFLICT OF INTEREST

Conflict of interest declared none

REFERENCES

1. Reddy K.J. Medicinal plant research scenario in India. Info concepts India Inc, 25-28, (2004).
2. Shankar D., Ved D.K. A balanced perspective for management of Indian medicinal plants. Indian Forester, 129: 275-288, (2003).
3. Dahanukar S.A., Kulkarni R.A., Rege N.N. Pharmacology of medicinal plants and natural products. Ind J Pharmacol, 32: 81-118, (2000).
4. Ozarkar K.R. Studies on anti-inflammatory effects of two herbs *Cissus quadrangularis* Linn. and *Valeriana wallichi* DC using mouse model. Ph.D. Thesis, University of Mumbai, (2005).
5. Muthukumaraswamy S., Mohan V R., Kumaresan S. Pharmacognostic Studies on the Trunk Bark of *Ochna lanceolata.* J Med Aromat Plant Sci, 25: 344-349, (2003).
6. Lalitharani S., Mohan V.R., Maruthupandian A. Pharmacognostic investigations on *Bulbophyllum albidum* (Wight) Hook: f. Int J Pharm Tech Research, 3 (1): 556-562, (2011).
7. Bector N.P., Puris A.S. *Solanum xanthocarpum* in chronic bronchitis, bronchial asthma, and non specific unproductive cough. J Assoc Physicians India, 19: 741-744, (1971).
8. Gupta S S., Verma S .C .L., Singh C., Khandelwal P., Gupta N K. Chemical and pharmacological studies on *Solanum xanthocarpum* (kantakari). Ind J Med Res, 55-57, (1967).
9. Mukerji B. The Indian Pharmaceutical Codex. Indigenous drugs Council of Scientific and Industrial Research, India*,* 1: 254-255, (1953).
10. World Health Organization. *Quality control methods for medicinal plant material,* WHO Library Geneva, 110-115, (1998).
11. Ansari M.M, Ahmad J., Ahmad A. Pharmacognostic characterization and standardization of *Morus alba* stem bark. J Med Aromat Plant Sci, 28: 31-36, (2006).
12. Ansari S.H. Essentials of Pharmacognosy, 4th Edn, Birla Publications Pvt. Ltd: New Delhi. 589-593, (2010).
13. Bharat Gami., Parabia M.H. Pharmacognostic Evaluation of Bark and Seeds of *Mimusops Elengi* L. Int J Pharm Pharm Sci, 2 (4): 110-113, (2010).