PHARMACOGNOSTIC AND PHYTOCHEMICAL EVALUATION ON THE ROOT OF VITEX NEGUNDO LINN

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ABSTRACT

Vitex negundo Linn. belongs to the family Verbenaceae is well known for curing diseases such as skin diseases, obesity, diabetes, ear pain, diabetes, muscular pain and cough. This study deals with the Pharmacognostical and phytochemical evaluation of the root of Vitex negundo Linn. Pharmacognostical studies includes macroscopic, microscopic and physicochemical evaluation of the root. The transverse section of root showed the presence of cork cells, phloem, cambium, xylem and medullary rays. Physicochemical constants showed the values of total ash (1%), acid insoluble ash (0.4%), water soluble ash (12.5%), sulphated ash (4.5%), nitrated ash (1.5%), hot extraction(11.22%), water soluble extractive (10.6%), ethanol soluble extractive (13.4%), ether soluble extractive (1.6%), loss on drying (18.8%), swelling index(0.4) and mucilage content(0.2%) w/w. The preliminary phytochemical screening of the alcoholic extract showed presents of alkaloids, phenolic compounds, tannins, mucilage and flavanoids. This study helps to development of different standard parameters of the plant which help the identification and authentication of the plant.

KEYWORDS: Vitex negundo Linn, Pharmacognostical, Phytochemical, Root.

INTRODUCTION

All over the world especially in case of developing countries, approximately 80% of population continues to use traditional medicine in primary medical problems. In the past
years, research has been focused on scientific evaluation of traditional drugs of plant origin. There is an important need to systematically evaluate the plants used in traditional medicine. This research could lead to new drug discovery or advance use of indigenous herbal medicines for treatment. This increasing interest in plant derived drugs is mainly due to the current widespread belief that plant derived drugs are safe and more dependable than the costly synthetic drugs many of which have adverse side effects.\(^1\) Lack of documentation and quality control is main hindrance in the acceptance of herbal medicines.

*Vitex negundo* Linn. (Family- Verbenaceae) also known as nirgundi is reported to posses good medicinal value in the traditional system of medicine. It is a large aromatic shrub or a small tree up to 4.5 m in height, common throughout the country ascending to an altitude of 1500 m in the outer Himalayas. It is common in waste places around villages, river banks, moist localities and in the deciduous forests.\(^2\)

Leaves are palmately compound, 3 to 5 foliate, leaflets are lanceolate, margins are entire or crenate, terminal leaflets are 5 to 10 cm × 1 to 3 cm, lateral leaflets are smaller, all nearly glabrous above, aromatic. Flowers are small, bluish-purple in colour, in peduncled cymes, forming large, terminal, pyramidal panicles. The fruit is drupe, turns into black when ripe, 5 to 6 mm in diameter. The mature seeds sown in nursery beds normally germinate within 2 to 3 weeks. Plant can be reproduced readily from shoot cuttings. *Vitex negundo* Linn. roots are deep, strong and suckers. The root suckers can be utilized as planting material.

*Vitex negundo* Linn. is used in Ayurveda, Tibetan, folk, Siddha and Unani systems of medicine. It has been used as anthelmintic and as vermifuge. Also has been used in postnatal care as it reduces swelling of uterus. It is also useful in the first stage of gonorrhea, useful in sciatica, slip disc, and swelling of muscles, increases sexual power and cures the weakness of penis, reduces common weakness, makes one free from diseases, increases age, reduces cough, fever, swelling of lungs and spleen, heals wounds, and is also useful in eye diseases. Other used includes expectorant, carminative, digestive, anodyne, antiseptic, alterant, antipyretic, diuretic and emmenagogue, depurative, rejuvenating, ophthalmic, vulnerary, and tonic properties.\(^3\)

Many of the indigenous drugs have already been investigated as regards their botany and chemistry, a systematic standardization including Pharmacognostical and Physicochemical study is still lacking for the roots. The present investigation of *Vitex negundo* Linn. is a tool
to evaluate certain botanical and chemical standards, which will help in crude drug identification and checking adulteration, if any. Further study will greatly help as a tool in quality assurance of finished product of herbal drugs.

MATERIALS AND METHODS

Collection and authentication of plant

Root of *Vitex negundo* Linn. was collected from Malappuram District, Kerala in December, 2020. *Vitex negundo* Linn. were authenticated by Dr. P. Sreeja. Dept of Botany and Research Centre Sir Syed College Talipramba, Kannur, Kerala. The specimen bearing voucher has been deposited in the department of Pharmacognosy, College of Pharmaceutical Sciences, Government Medical College, Kannur, Kerala state.

Pharmacognostical studies

Morphology of dried root of *Vitex negundo* Linn. Was studied. Free hand transverse sections of Root was studied, using Phloroglucinol and hydrochloric acid (1:1) as staining agent.\[^{4}\] Photomicrography was performed. The dried root powdered, sieved to 60#, stored in airtight containers and used for powder study and quantitative microscopy.

Physicochemical parameters

The moisture content, total ash, sulphated ash, nitrated ash, water soluble ash, acid insoluble ash, alcohol, water, ether soluble extractive values, hot extraction, foaming index, swelling index, mucilage content were determined as a part of its physicochemical characters.\[^{5,6,7}\]

Phytochemical screening

30g powder was extracted with 150 ml each of ethanol at 76°C until solvent become colourless. Various phytoconstituents present in the root was detected by their respective chemical tests using ethanolic extract.\[^{8}\]

RESULTS AND DISCUSSION

Pharmacognostical study

Plant profile
Kingdom - Plantae
Subkingdom - Tracheobionta
Super division - Spermatophyte
Division - Magnoliophyta
Class - Magnoliopsida
Order - Lamiales
Family - Verbenaceae
Genus - Vitex
Species - Negundo

Macroscopy
Roots are tough, hard, cylindrical in shape. Have irregular fractures. External surface is rough due to small rootlets and longitudinal, narrow, cracks. Cut surface shows cork region greyishbrown in colour, middle region is greyish-white. Xylem region is cream coloured. Bark is thin, easily separates from wood. Wood hard, forms major part of root.
Microscopy

Transverse section

Root shows cork cells of 10 to 18 tangential rows, rectangular to cubicular and moderately thick-walled. Few rows of radially arranged cork cells also present. The inner 3 to 5 rows of cork cells are thin-walled. Cork cambium consists of squarish to transversely elongated cells in single row. Secondary cortex composed rectangular to elongated cells of 4 to 12 rows, some contain starch grains. Numerous, small groups of stone cells found scattered.

Secondary phloem consists of sieve tubes with companion cells, fibres and phloem parenchyma traversed by phloem rays. Each band of phloem composed of thin-walled, phloem tissues alternating with transverse strips of thick-walled phloem fibres. A few tangential strips of obliterated phloem tissues also present in outer-phloem region. Each fibre group composed of 6 to 60 or more thick-walled, long and short fibres, inner zone of phloem composed of intact, thin-walled, phloem tissues mainly sieve tubes, companion cells and phloem parenchyma.

Cambium composed of one, or sometimes two, rows of cells; central major part of root consists of xylem; vessels varying in size, scattered throughout xylem region, either in small groups of 2 to 4 or singly; a few xylem vessels show tail on one or both the ends; xylem fibres long, having thick-walls and pointed tips; xylem parenchyma contains starch grains similar to those found in cortical region; medullary rays are uni-to triseriate, almost straight, extend from pith to cork, medullary rays in xylem region radial while in phloem region they dilate; cells contain starch grain, simple and compound, oval to circular, having 4 components.
Powder characteristics

Powder is Brown colour. Powder shows parenchymatous cells having simple oval to round and compound starch grains with 4 components, measuring 8 to 12 µ in diameter; stone cells elongated, rectangular and squarish in shape with wide and narrow lumen, radiating canals and conspicuous striations; xylem vessels with pitted thickening, xylem and phloem fibres with thick walls.

Fig. 3: Transverse sections of *vitex negundo* linn. root.

Fig. 4: Powder form of *vitex negundo* linn. root.

Fig. 5: Fibre.

Fig. 6: Medullary rays.
Physicochemical parameters

Physicochemical parameters are important parameters in detecting adulteration and are adopted to confirm the purity and quality of drug. Ash values are particularly important parameter as it shows the presence and absence of foreign matters like silica, metallic salts etc.

Phytochemical evaluation

Phytochemical screening showed the presence of alkaloids, flavonoids, tannins, mucilage and phenolic compounds.

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<thead>
<tr>
<th>Tests for constituents</th>
<th>Ethanolic extract</th>
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<tbody>
<tr>
<td>Carbohydrates</td>
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<td>Mucilage</td>
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<td>Protein</td>
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<td>Amino acid</td>
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<td>Fats and Oils</td>
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<td>Phytoconstituents</td>
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<td>Steroids</td>
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<td>Glycosides</td>
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<td>Alkaloids</td>
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<td>Tannins</td>
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**DISCUSSION**

The present work deals with the Pharmacognostical and phytochemical study of the root of the *Vitex negundo* Linn. Phytochemical analysis showed the presence of important classes of phytoconstituents like alkaloids, mucilage, flavanoids, phenolic compound and tannins. This indicates that the root can be useful for treating different diseases because the activity of a plant is due to the presence of particular class of compounds. The present work can be useful in standardizing the herbal formulations containing root of *Vitex negundo* Linn.

**CONCLUSION**

It is concluded that the above parameters are very useful for the identification and authentication of the species. The results of the present study will also be helpful in preparation of monograph.

**REFERENCES**

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