WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.074
Volume 8, Issue 8, 282-289. Review Article ISSN 2277– 7105

A REVIEW ON "PHARMACOGNOSTIC, PHYTOCHEMICAL STUDY OF *AZADIRACHTA INDICA*" BARK EXTRACTS

Gite Dipika U.*, Vikhe Sunaina R. and Jadhav Ravindra S.

Department of Pharmacognosy, Pravara Rural College of Pharmacy, Pravaranagar-413736, Maharashtra, India.

Article Received on
29 April 2019,
Revised on 19 May 2019,
Accepted on 09 June 2019
DOI: 10.20959/wjpr20198-15259

***Corresponding Author**
Gite Dipika U.
Department of Pharmacognosy, Pravara Rural College of Pharmacy, Pravaranagar-413736, Maharashtra, India.

ABSTRACT

Azadiracta indica A. Juss (Meliaceae) commonly known as Neem, is found throughout India and is known to have many wonderous properties from ancient times. These *A. indica* shows different medicinal properties like antiulcerogenic, hypoglycemic, insecticidal, spermicidal actions. The stem bark was studied for morphological as well as microscopical characteristics. The stem bark was evaluated for different physical constant like ash value, moisture content and foreign matter. The transeverse section of *Azadiracta indica* stem bark was taken and these section were stain with Phloroglucinol and HCL, sudan red III, dil. iodine solution. The microscopical study report shows the presence of xylem, phloem, medullary rays, starch grains and calcium oxalate crystals. These histological characteristics present in the plant shows that the plant contain primary and secondary metabolites which having role in different diseases.

KEYWORDS: *Azadiracta indica*, xylem, medullary rays, starch grains, phloem.

INTRODUCTION[1,2]

The plant product or natural products show an important role in diseases prevention and treatment through the enhancement of antioxidant activity, inhibition of bacterial growth, and modulation of genetic pathways. The therapeutics role of number of plants in diseases management is still being enthusiastically researched due to their less side effect and affordable properties. It has been accepted that drugs based on allopathy are expensive and also exhibit toxic effect on normal tissues and on various biological activities. It is a largely accepted fact that numerous pharmacologically active drugs are derived from natural resources including medicinal plants.

Looking back over historical aspect of Anxiolytic Activity we can appreciate that many strides have been made in understanding and treatment especially of acute and sub-acute Anxiolytic Activity. Neem is a tree in the mahogany family Meliaceae. It is one of two species in the genus *Azadirachta*, and is native to India and Burma, growing in tropical and semi-tropical regions. It is a fast growing tree that can reach a height of 15-20 m, rarely to 35-40 m. It is evergreen but under severe drought it may shed most or nearly all of its leaves. The branches are wide spread. For thousands of years the beneficial properties of Neem (*Azadirachta indica*) have been recognized in the Indian tradition. Each part of the neem tree has some medicinal property. The taxonomical classification of neem is, Rutales (Order), Rutinae (Suborder), Meliaceae (Family), Melioideae (Subfamily), Meliaceae, Azadirachta (Genus), and indica (Species).

Different types of preparation based on plants or their constituents are very popular in many countries in diseases management. In this vista, neem (*Azadirachta indica*), a member of the Meliaceae family, commonly found in India, Pakistan, Bangladesh, and Nepal, has therapeutics implication in diseases cure and formulation based on the fact that neem is also used to treat various diseases. *Azadirachta indica* has complex of various constituents including nimbin, nimbidin, nimbolide, and limonoids and such types of ingredients play role in diseases management through modulation of various genetic pathways and other activities. Quercetin and ß-sitosterol were first polyphenolic flavonoids purified from fresh leaves of neem and were known to have antifungal and antibacterial activities. This review summarizes pharmacognostic & phytochemical study of *Azadirachta Indica* Bark Extracts and the role of neem and its active ingredients in the diseases prevention and treatment through the modulation of various biological pathways.

TAXONOMY OF *Azadirachta indica*[3]

Kingdom – Plantae

Division – Magnoliophyta

Class – Dipsacales

Order- Rutales

Sub-order- Rutinae

Genus – Azadirachta

Species – indica.

Active Compounds of *Azadirachta indica* L. (Neem)[9-11]

Azadirachta indica L. (neem) shows therapeutics role in health management due to rich source of various types of ingredients. The most important active constituent is azadirachtin and the others are nimbolinin, nimbin, nimbidin, nimbidol, sodium nimbinate, gedunin, salannin, and quercetin. Leaves contain ingredients such as nimbin, nimbanene, 6 desacetylnimbinene, nimbandiol, nimbolide, ascorbic acid, n-hexacosanol and amino acid, 7-desacetyl-7- benzoylazadiradione, 7-desacetyl-7-benzoylgedunin, 17-hydroxyazadiradione, and nimbiol, Quercetin and ßsitosterol, polyphenolic flavonoids, were purified from neem fresh leaves and were known to have antibacterial and antifungal properties and seeds hold valuable constituents including gedunin and azadirachtin

Pharmacological Actions[5]

Abortifacient, anthelminthic, antiyeast, antiulcer**,** antifertility, antifilarial, antifungal**,** antiviral**,** *diuretic***,** antihyperglycemic, 284nti-inflammatory, antimalarial, antinematodal, antipyretic, antispermatogenic**,** hypercholesteremic, antispasmodic, insecticidal, antitumor, hypoglycaemic, immunomodulatory.

Medicinal use

All parts of tree have been used medicinally for centuries. It has been used in Ayurvedic medicine for more than 4000 years due to its medicinal properties. The earliest Sanskrit medical writings refer to the benefits of Neem's fruits, seeds, oil, leaves, roots and bark. Each has been used in the Indian Ayurvedic and Unani medicine and now being used in pharmaceutical and cosmetics industries.

MATERIALS AND METHODS

Collection of plant material

The fresh bark of *Azadirachta indica Linn (Neem)* were collected

The plant material was identified and authenticated at, BSI Pune.

Pharmacognostic Study[7]

1. **Microscopy:** Microscopical study was done as per method described by Khandelwal, (2011). Tranvers section of bark was taken, stained with phloroglucinol: Hydrochloric acid (1:1), iodine, Sulphuric acid and observed under electronic microscope at 10X.

DESCRIPTION

Macroscopic Description[8]

Tree: The neem tree (*Azadirachta indica*) is a fast growing (up to twenty feet in three years) tropical evergreen related to mahogany. It will grow where rainfall is as little as 18 inches per year and thrives in areas that experience extreme heat of up to 120 0F. They are reported to live for up to 200 years.

Stem Bark

Bark varies much in thickness according to age and parts of tree from where it is taken; external surface rough, fissured and rusty-grey; laminated inner surface yellowish and foliaceous, fracture, fibrous; odour, characteristic; taste, bitter. Shows outer exfoliating pieces hard, woody, considerably thick in older barks; almost entirely dead elements of secondary phloem, alternating with discontinuous tangential bands of compressed cork tissue, former composed of several layers of stone cells occurring in regularly arranged groups together with collapsed phloem elements filled with brown contents; in between the successive zones of cork tissue 3-5 layers of fibre groups with intervening thin-walled and often collapsed phloem elements present; each zone of cork tissue consists of several layers of regular, thinwalled cells occasionally with a few compressed rows of thick-walled cells towards.

ORIGIN AND DISTRIBUTION

The neem tree occurs throughout India. According to an estimate, there are about 20 million trees in the country. 2 The neem tree is noted for its drought resistance. Normally it thrives in areas with sub-arid to sub-humid conditions, with an annual rainfall between 400 and 1200 mm. It can grow in regions with an annual rainfall below 400 mm, but in such cases it depends largely on the ground water levels. Neem can grow in many different types of soil, but it thrives best on well drained deep and sandy soils (*p*H 6.2-7.0). It is a typical tropical/subtropical tree and exists at annual mean temperatures between 21-32 °C. It can tolerate high to very high temperatures. It does not tolerate temperature below 4 °C (leaf shedding and death may ensue).

1) Evaluation of Physical Constant[6]

Determination of Moisture content: Accurately weighed 1.5 gm of dried powder of bark in porcelain dish and loaded in oven at 105^{o}C. The sample was dried to constant weight. After drying was collected to room temperature in a desiccator. Weighed and the loss on drying was calculated in terms of percent w/w (Indian pharmacopoeia. 1996).

Determination of Total Ash[4]: Accurately weighed 2 gm of air dried crude drug was taken in a tared silica dish incinerated at a temperature of not exceeding 450^{o}C until free from carbon, cooled and weight was taken. The percentage of ash was calculated with reference to the air dried drug (Indian pharmacopoeia. 1996). the total ash was found 16.19% (w/w).

Determination of Water-soluble Ash: The ash was obtained as per method described above and boiled for 5 minutes with 25ml of water, filtered and collected the insoluble matter on ash less filter paper, washed with hot water and ignited for 15 minutes at a temperature not exceeding 450^{o}C and weight was taken. Subtracted the weight of insoluble matter from weight of the ash; the difference in weight represents the water-soluble ash. The percentage of water –soluble ash was calculated with reference to the air-dried (Indian pharmacopoeia. 1996). The water soluble ash was found 04.27% (w/w).

Determination of Acid-Insoluble Ash: The ash was obtained as per described and boiled 5 minutes with 25 ml of 2M Hydrochloric acid, filtered and collected the insoluble matter on ash less filter paper, wash with hot water and ignited cooled in desiccater and weighed. The percentage of acid-insoluble ash was calculated with reference to the air-dried dried drug (Indian pharmacopoeia. 1996). The water Acid-Insoluble ash was found 02.00% (w/w).

Ethanol soluble extractive

5g of previously weighed air dried drug was taken in a Stoppard flask and 100ml of 95% ethyl alcohol was added to it was shaken continuously for 4 h on an electric shaker. It was then filtered rapidly taking precautions against loss of solvent. 50ml of the filtrate was evaporated to dryness in a tared flat bottomed Petridis, dried at 1050C and weighed. The percentage of ethanol soluble extractive was calculated with reference to the air dried drug.

Water soluble extractive

5g of previously weighed air dried was taken in a Stoppard flask and 100ml of chloroform water was added to it. It was shaken continuously for 4 h on an electric shaker. It was then filtered rapidly taking precaution against loss of solvent. 50ml of the filtrate was evaporated to dryness in a traed flat bottomed Petridis, dried at 1050C and weighed. The percentage of water soluble extractive was calculated with reference to the air dried drug.

Foreign Organic Matter (FOM)

It is the material consisting of any or all of the following: Parts of the organ or organs from which the drug is derived other than the parts named in the definition and description or for which the limit is prescribed in the individual monograph

b) Any organs other than those named in the definition and description.

c) Matter not coming from the source plant and

d) Moulds, insects or other animal contamination.

Method: 100-500g of the original sample was spread was spread out in a thin layer. The sample was inspected with the unaided eye or with the use of a 6X lens and the foreign organic matter separated manually as completely as possible. The percentage of FOM from the weight of the drug taken was weighed and determined.

Preparation of Plant extracts

The bark was dried in the shed and coarsely powdered.

Hydroethanolic Maceration

Hydroethanolic extracts of the neem bark produced by treating the powdered neem bark with ethanol and water at a temperature from 0° to 40° C. The powdered drug socked in solvent for Three days with continuous agitation in stoppered conainer. The mixture was strained of by means Filtration. The extract was evapourated and concentrated extract was collected.

RESULTS AND DISCUSSION

Ash values

The total ash value was found to be 3.47%w/w. the acid insoluble value and water soluble ash values were found to be 1.12% w/w and 4.2%w/w respectively. The results were shown in **Table-1.**

Table No. 1: The ash values of stem bark of *Azadirachta indica Linn (Neem).*

Sr. No.	Parameter Ash value (%w/w)
1	Total ash value 3.47
2	Acid insoluble ash value 1.12
3	Water soluble ash value 4.2

Extractive values

The results of the extractive values were shown in **Table-2.** The water soluble extractive value was found to be 18.12% w/w. the ethanol soluble and ether soluble extractive values were found to be 14.32% w/w and 3.42% w/w respectively.

Table No. 2: The extractive values of stem bark of *Azadirachta indica Linn (Neem).*

S. No.	Type of extract value (%w/w)
1	Water soluble extract 18.12
2	Ethanol soluble extractive 14.32
3	Ether soluble extractive 3.42
4	Loss on drying 4.14

Other physico-chemical parameters

The results of the other physic chemical parameters like foreign organic matter, moisture content, bitterness value, foaming index and swelling index were shown in the **Table 3.** The foreign organic matter was found to be 0.24% w/w whereas the moisture content, foaming index and swelling index were found to be 15.85% w/w, less than 10.0 and 20 respectively. The results showed that the drug powder does not have any bitterness value and mucilage content.

Table No. 3: The physico chemical parameters of stem bark of *Azadirachta indica Linn (Neem).*

Sr. No.	Parameter Value
1	Foreign organic matter 0.24 %w/w
2	Moisture content 15.85 %w/w
3	Bitterness value Nil
4	Foaming index Less than 100
5	Swelling index 3.70
6	Mucilage content Nil

CONCLUSION

In the conclusion it can be said that the present article reviews the pharmacognostic and phytochemical characterization of Azadirachta indica(neem). Natural products or their derivatives role in diseases cure and prevention is increasing worldwide due to less side effect properties. Clinical based studies confirmed that neem plays pivotal role in prevention of various diseases.[5] The role of active ingredients as chemo preventive effect has been noticed in various tumour via modulation of numerous cell signalling pathways. The detailed study should be made based on animal to know the exact mechanism of action in the diseases management.

REFERENCES

1. K. Sudhakar Babu, V. Krishna Murthy Naik, J. Latha and K. Ramanjaneyulu Physicochemical properties and spectral characterisation of natural product S.K. University, Anantapuramu-515003., India.
2. Mohammad A. Alzohairy, Review Article on Therapeutics Role of Azadirachta indica (Neem) and Their Active Constituents in Diseases Prevention and Treatment Department of Medical Laboratories, College of Applied Medical Sciences, Qassim University, P.O. Box 6699, Buraidah, Saudi Arabi.
3. Alok Maithani, Versha Parcha, Geeta Pant, Ishan Dhulia, and Deepa Kumar Azadirachta indica (neem) leaf: a Review Received on: 11-02-2011; Revised on: 16-03-2011; 1-2,3. Accepted on:21-04-2011
4. Indian Pharmacopoeia, government of India, ministry of health and welfer, controller of publications, New Delhi, 1996; 2: A53-A54.
5. Amir Khan, Arvind Kumar Yadav, Therapeutic potential of "neem" (Azadirachta indica). Dept. of Biotechnology & Biochemistry Sardar Bhagwan Singh Post Graduate Institute of Biomedical Sciences & Research, Dehradun.
6. C.K. Kokate, S.B. Gokhale, A.P. Purohit Text book of pharmacognosy, 7.1- 7. 12.
7. K.R Khandelwal Practical Pharmacognosy, Techniques and experiments by, Nirali Prakashan, 2.1-3.5.
8. Ayurvedic Pharmacopeia of India, Government of India, 1(2): 131-132.
9. A. Ali, *Textbook of Pharmacognosy*, Publication and Information Directorate, New Delhi, India, 1993.
10. M. A. Hossain, M. D. Shah, and M. Sakari, "Gas chromatography–mass spectrometry analysis of various organic extracts of *Merremia borneensis* from Sabah," Asian Pacific Journal of Tropical Medicine, 2011; 4(8): 637–641.
11. C. Kokate, A. P. Purohit, and S. B. Gokhale Pharmacognosy, Nirali Prakashan, Maharashtra, India, 2010.