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PHYTOCHEMICAL PROPERTY OF AQ-ALCOHOLIC EXTRACTS OF NEEM LEAVES LEADS TO HERBAL TREATMENT

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Abstract

The therapeutic applications of Neem Leaves, a prominent medicinal plant in traditional Ayurveda, have garnered international acclaim for their extensive medical capabilities. It contains many bioactive chemicals, including nimbin, azadirachtin, and quercetin. The aqueous alcoholic extract of *Azadirachta indica* (Neem) leaves contains a variety of phytochemical elements, including flavonoids, tannins, saponins, alkaloids, and terpenoids. The bioactive chemicals significantly improve neem's therapeutic efficacy in herbal medicine. The extract demonstrates notable anti-inflammatory, antioxidant, antimicrobial, and immunomodulatory activities, which support its traditional and modern applications in treating various ailments. In Vitro studies, we have found the presence of Flavonoids, saponins, alkaloids, terpenoids, and tannins. This study highlights the phytochemical properties of neem's aqueous-alcoholic extract and its relevance in the development of safe and effective herbal treatments.

Keywords:

Azadirachta indica, neem , aqueous – alcoholic extract , phytochemicals , herbal medicine , antioxidant , antimicrobial , anti – anti-inflammatory, bioactive compounds, Vitro studies, nimbin, azadirachitin, quercetin.

1. Introduction

Many medicinal plants are utilised to make allopathic medicine, and medicinal plants have long been employed to make autochthonous medications. In recent years, a variety of medications have been developed from medicinal plants or herbs that are used to treat illnesses; these methods were all highly popular in the past (1).

The consistent use of many antibiotics has become effective against bacterial pathogens. A dose of antibiotics kills the foreign or infectious agents. It is proven that Neem works as an

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Antibiotic for many illnesses. It is mostly used due to its antimicrobial activity (2). Neem was universally accepted to be used in herbal medicine, ayurveda, and homeopathic medicine, and it is utilized in allopathic medicine. It is also addressed as "Reliever of sickness". It is very well known as 'Sarba–Roga nibarini'. The Neem tree is still mentioned as the Village dispensary in India.

Every component of the neem tree possesses potential medicinal applications, hence it is utilised to its fullest potential. Over the past 50 years, significant advancements have been made with a high concentration of neem biopharmaceuticals. It is now recognised as a significant source of odd natural elements. They were created as antidotes for a number of illnesses or disorders, as well as for the mass manufacturing of high-tech products. The herbal plant possesses certain physiological effects on the human body due to its properties. Nimbin, Azardirachta, Meliacin, Gedunin, valissin, salanin, and other antioxidants are among the biometabolites that were separated from the plant. meliacin, which gives neem seed oil its pungency, and tignic acid (5-methyl-2-butanoic acid), which comes from neem seeds, which gives them their distinct smell (3,4).

These substances, which are triterpenoids, have organic effects that function as active medicinal ingredients. These effects are predominantly lipophilic as well as soluble in organic solvents, such as alcohols and hydrocarbons (5).

Nowadays, there is great inflation of demanding for Neem products or Neem derivatives supplements due to their greater enhancement activity for good health. Herbal medicaments are store storehouse of good qualities and also possess bonus point of not having any side effects, which affect health negatively. Meanwhile, in allopathy or chemically synthesized drugs, they could affect the body in a silent form, and results occur later.

In vitro studies, qualitative and quantitative analysis of Neem plant have shown various results which support the consumption of the Neem plant in any form, such as Tablets.

Powder, Capsule, or Neem leaves. It possesses all nutritional value which supports good health in every aspects.

1.1 Morphology of Neem Leaves

Neem plant is estimated height of 15-20 meters. Because of its vast root capacity it has heavy roots, branches of tree are spread out widely and crown of oval shapelike structure was formed. Colour of bark is Dark brown and also called Neem Chal

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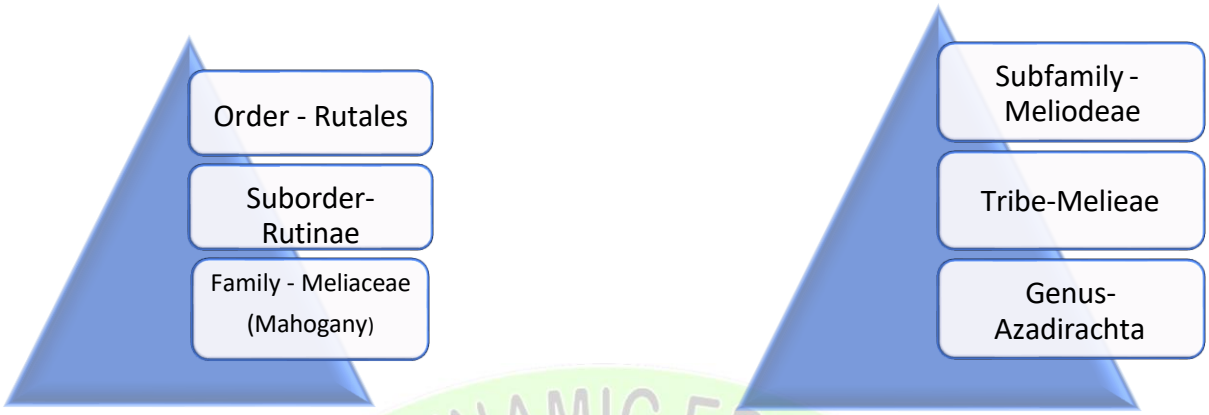

Fig 1. Classification of Azadirachta Indica

1.2 Value of Phytochemicals.

Neem is considered a powerhouse of various remedial particles, and later, it is mentioned as a 'miracle drug'. For many years, phytochemicals have been isolated from Neem plant, which are chemically varied and structurally complicated. Alkaloids, flavonoids, saponins, tannins, phenols, carbohydrates, anthroquinone, glycosides, terpenoids, and steroids are among the main phytochemicals identified in in vitro research. Research is being conducted on chemical mechanisms under in vitro conditions to enhance the beneficial effects of phytochemicals against cancer, diabetes, hypertension, coronary heart disease, inflammation, microbial, viral, and parasitic infections, spasmodic conditions, psychotic disorders, ulcers, and various other ailments. This atypical plant possesses medicinal properties in several components of the neem tree, including:

Seeds - include neem oil, which is used as an insect repellent, bactericide, analgesic, anti-helminthic, anticholinergic, antihistaminic, antipyretic, and antiprotozoal, among many other uses.

Leaves – include insecticides, nematicides, antifungal, anticoagulant, anti-tuberculosis, anticancer, antiseptic, and insect repellent properties.

Twigs – used for toothache reliever, oral deodorant, and tooth cleaners.

- **Bark –** neem bark or chal has antidermatic, antitumor, antiallergic, antiprotozoal, and antifungal properties.
- **Flowers** have both stimulating and analgesic properties. Neem has medicinal properties that play a key part in bioactivity, which significantly amplifies the action of phytochemicals and make them seem like the main characters in its herbal cures. All of the chemicals function in concert to enhance neem's biological activity because of their synergistic impact.
- Phytochemicals facilitate plants as self-defense against pests and infectious agents for further

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significance. (7)

1.3 Chemically synthesized drugs vs. herbal medicaments

Medicinal plants show various of biological activity which supports for development of good health. Some of properties such as antioxidant activity, phytochemicals. The majority of the commonly used pharmaceuticals, including Aspirin, Clopidogrel, Diclofenac, Enoxaparin, and Ibuprofen, are used to treat mild pains and headaches. However, they can also cause serious side effects, such as heavy bleeding, haemorrhage, and difficulty breathing, among other symptoms (8).

Whereas in herbal medicaments, there are no side effects, and they possess various nutritional values intact and are easily affordable. Medicinal plants are phytochemical substances utilised for the treatment of various ailments. Plants contain active pharmacological compounds that function as medicinal agents (9). Herbal remedies are expensive than allopathy or chemically synthesized drugs, and a number of people have unquestioning acceptance. They are plant-based remedies that terminate the diseases and provide side-effect-free results.

As a result, we should consider using herbal or natural medications, which promote health and prevent side effects. We can also lessen the toxicity of synthetic counterparts and optimise therapeutic results with the strongest and most potent effects.

REVIEW OF LITERATURE

The health advantages of medicinal plants, especially their phytochemical, antibacterial, and antioxidant qualities, have been the subject of much research. The purpose of this review is to summarize the available literature on the phytochemical content of aqueous and alcoholic extracts of these plants, especially in relation to food borne pathogens(WHO 2014).

The phytochemical composition, antioxidants, and antimicrobial activity of Neem contain essential components respectively such as rich in flavonoids, tannins, phenolic acids, antimicrobial properties, antioxidants, coumarins, essential oils, glucosinolates, isothiocyanates, Limonoids, terpenoids, and glycosides. Antioxidant potential of aqueous and alcoholic extracts has been measured using assays like DPPH and FRAP, which indicate their ability to scavenge free radicals. The comparative study of neem reveals that every plant has unique strengths in terms of phytochemical content, antioxidant properties, and antimicrobial activity. Neem leaves offer significant health benefits, particularly in the context of antimicrobial activity against foodborne pathogens. These plants act as natural preservatives & health supplements, especially in combating foodborne illnesses & oxidative stress-related

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diseases (WHO 2023). Azadirachta indica (Neem) has a great demand, which gives a notable change and is utilized in various forms as supplements. Areas of post-harvest food packaging, agroforestry, reforestation, and sustainability (10). Alkaloids, saponins, phenolics, flavonoids, tannins, terpenoids, and carbohydrates are among the phytochemicals found in neem leaves. These qualitative characteristics help in the creation of herbal medications. These results create a fresh avenue for inspiration to further the growth of herbal medicine (11).

METHOD

- **3.1 Collection of plant** -The Leaves of Neem had been collected from local places of Gwalior (Madhya Pradesh) and dried in shade, so it is said to shade drying of Neem leaves were shade-dried.

(Fig. 2 Shade drying of Neem leaves) (Fig. 3 Aqueous solution of neem extract)

- **3.2 Material required-** dried Neem powder, distilled water, Whatman filter paper Grade 1, hot plate, beaker, weighing machine, spatula, Respective reagents, etc.
- **3.2.1Method of Aqueous Extraction of Neem leaves** –
- **Procedure** -Take 10 gm of Dry Neem leaves and add 100ml of distilled water and heat on a hot plate at a temperature of 80 °C till its extracts completely out, now after completion cool it and filter it with Whatman filter paper Grade 1(125mm). now heat the neem leaves extract on hot plate at temperature 80°C - 90°C till its consistency is perfectly balanced and after completion transfer neem leaves extract in bile.
- **3.3 Analysis of Phytochemicals: -**Standard qualitative tests will be employed to identify the presence of major phytochemicals that involve Flavonoids, Tannins, Phenolic, Saponins, Terpenoids, Carbohydrates, Alkaloids, biometabolites. Techniques like phytochemical screening.
- **3.3.1 Test for Flavonoids**

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ALKALINE reagent -Add five mililitres of distilled water and 300 mg of neem leaf extract to a test tube. Add a few drops of sodium hydroxide (NaOH) for a strong yellow hue. A few drops of diluted HCL acid turn the material colourless, indicating flavonoids.

3.3.2 Test for tannins

- **FERRIC CHLORIDE TEST-**Take 300mg of neem leaves extract in 5ml distilled water and mixed well with spatula add few drops of Ferric chloride Blue-Black colour forms which confirms the presence of Tannins.

3.3.3 ***Test for Phenolics***

- **FERRIC CHLORIDE TEST-**Take 300mg of neem leaves extract in 5ml distilled water and mixed well with spatula add few drops of Ferric chloride Blue-Black colour forms which confirms the presence of Phenolics.
- **3.3.**4 **Test for Saponin**
- **FOAM TEST** - Take 300mg mg Neem Leaves extract in 5ml of distilled water in a test tube. Now, place your thumb on the test tube to cover the test tube.
  Now, shake the test tube it forms Foam, which indicates the presence of Saponin.

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