

An Overview on the phytochemical investigation of therapeutic plants

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ABSTRACT

Phytochemical screening is an important step in detecting bioactive principles contained in therapeutic plants, and it might lead to the development of new therapeutics. The main phytoconstituents of chosen herbal plants were discovered in this study in order to link their presence to the bioactivities of the plants. The presence of steroids, alkaloids, flavonoids, carbohydrates, amino acids, and protein was detected using conventional techniques during the screening of the plants. The occurrence of these phytochemicals can be associated with a plant's therapeutic potential. The collecting of plants, the extraction of active compounds from diverse sections of plants, and the qualitative and quantitative analysis of phytochemicals are the primary topics of this article. More research on these plants is needed to assess their pharmacological potentials, isolate, describe, and clarify the structures of the bioactive chemicals that are responsible for their actions, as well as additional medical applications.

Keywords

Antibacterial, Medicinal, Phytochemical Screening, Qualitative, Quantitative.

1. INTRODUCTION

Plant extracts are a valuable source of new pharmaceuticals that are used to make traditional and contemporary medicines, pharmaceutical intermediates, and lead molecules in therapeutic agents. The concept that they contain chemical components with therapeutic effect is the rationale for their use as medication. These chemicals, which are found naturally in plant extracts, leaves, vegetables, and roots, have a survival tactic and protect against a variety of illnesses. Plants have therapeutic relevance because of secondary metabolites which have a specific physiological function in the body. In recent decades, there has been a greater emphasis on plant research across the worldwide, and a substantial body of data has accumulated to illustrate the tremendous therapeutic potential employed in many traditional systems, including hepatocellular carcinoma therapy. We focused on preliminary analysis, quantitative screening, and qualitative isolation of secondary metabolites from either the leaf of a few distinct therapeutic plants in this work [1].

Alkaloids, carbohydrates, steroids, amino acids, proteins, and flavonoids are some of the chemical components found in therapeutic plants that have a diverse physiological effect on the body [2][3]. The primary or secondary metabolism of biological systems produces these components. Secondary metabolites are a group of chemically and evolutionarily varied molecules with

unknown functions. They're frequently utilized in medical research, clinical psychology, agricultural, biomedical research, and a variety of other fields. In vitro, a wide variety of phytonutrients from various chemical categories have been demonstrated to have regulatory effects on various bacteria. Medicinal plants have been used in therapeutics from the beginning of time [4]. Barks, leaves, flowers, roots, fruits, and seeds may all be used to make this. It has a diverse geography and climate, which has an impact on the vegetation and taxonomic composition of the area [5-9]. Furthermore, the different agricultural conditions favor the introduction and adaptation of new exotic plant species only three species were selected as shown in Table 1. However, a vast variety of tropical plants have yet to be thoroughly researched for its potential.

Table 1: Illustrating the Phytochemical aspects in three selected indigenous plants of India

Indigenous plants	Part of the plants
Adhatoda Vassica	Roots, leaves and flowers
Adiantum philippense	Whole parts
Alangium salvifolium Wang.	Root, root-bark, leaves, fruits, seeds

Family I- Acanthaceae. Adhatoda Vassica Nees (Figure 1)



Figure 1: Illustrating the Adhatoda Vassica Nees, showing leaves, flowers, and roots

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- Habit: Adhatoda Vassica small tree and thicker.
- Habitat: All over India. Frequently widely cultivated near human settlements and is generally categorized as a hedging plant.
- Chemical composition: Adhatoda Vassica is a source of quinozoline alkaloids. It contains betaine, vasicinone and one percent of new alkaloid vasicine. The chief active principle quinozoline alkaloids yield from different samples from India, while in foreign samples it is high as adhatodic acid (2.18 percent). Alcoholic extract of leaves is useful as hypotensive, bronchodilator, and respiratory stimulant.
- Therapeutics: Because of its antispasmodic properties, Adhatoda Vassica is a well-known treatment for allergies, common cold, pneumonia, and other respiratory diseases. It's the major ingredient in cough syrup. Plant is Unpleasant, astringent, diuretic, antispasmodic, antiseptic, and an alternative solution. Nausea, dehydration, dermatosis, jaundice, illness, and hematemesis are all treated with it. It's especially effective for fevers caused by bilious and breathing diseases, as well as piles. Expectorant and moderate lung antiseptic, the roots are used to cure intermittent fevers. It is employed in all of the same complaints and sicknesses as Adhatoda Vassica, but its effectiveness and usefulness are much more definite and certain because there is more blood with cough and where there is more inflammation or blood vomiting in tuberculosis [10].

Family II- Acanthaceae. *Adiantum philippense* Linn (Figure 2)

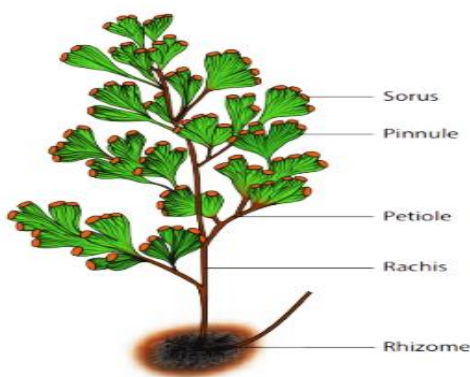


Figure 2: Illustrating the schematic view of *Adiantum philippense* Linn habit

- Habit: The ferns are obliged. A rhizomatous herb of uncertain size.
- Habitat: It may be found all throughout the North India's wet regions and the south India. In the western part of India, it may be quite widespread.
- Chemical composition: Higher carotenoids and degradation products of chlorophyll.
- Therapeutics: *Adiantum philippense* has a bitter, alexiteric smell. Blood sickness, epileptic fits, burning sensations, fever illnesses, and ulcers are all treated with this plant. Also good for atrophy, emaciation, and muscle discomfort, as well as cachexy, rabies, and diarrhea, and as a cooling lotion for erysipelas. It is used to treat gonorrhoea using asparagus racemases. Roots are used to treat fever and erysipelas. Elephantiasis strangury and fever are treated with rhizome. Throat infections and inflammatory illnesses in youngsters

are treated with a rhizome decoction. Fever, leprosy, and erysipelas are treated with the fronts and berries. The plastered fonts are used to treat chronic gouty and some other swellings, but also chronic malignancies [11].

Family III- Alangiaceae. *Alangium salvifolium* Wang (Figure 3)



Figure 3: The systematic view of *Alangium salvifolium* Wang. (A) Whole plant (B-C) Floral bud leaves (D) Fruit (E) Spine of stem

- Habit: A branching deciduous shrub and tree.
- Habitat: A scarce tree in coastal regions, but abundant in the forests of South India and throughout the dryer regions of India.
- Chemical composition: Alangicine and alangine A and B, marckidine and marckine, tubulosine, emetin, and cephaeline are amorphous alkaloids found in the plant. Alkaloid lowers blood pressure momentarily, causes erratic breathing, increases peristaltic movement of the colon, and depresses the heart in modest dosages. At lower and hypotensive e levels, total alkaloids in seeds have a persistent and extended hypertensive impact at higher doses.
- Therapeutics: *Alangium salvifolium* is a well-known individual agent for rabies therapy. Spleen enlargement, anasarca, stomach soreness, colic pain, dropsy, cholera, snakebite, and pneumonia are all treated with various components. Roots are moisturizing, astringent, and diuretics, and they can help with skin and fever problems. Root bark is used to treat rabid dog bites both inside and topically. Skin illness can be cured using root paste and decoction. It is a reputed remedy for leprosy as well as other skin diseases, as well as syphilis, colic, and diarrhea. Bark extract is administered orally for lowering blood pressure and is beneficial in simplistic continued fevers, inflammation, and it is a regarded remedy for leprosy and some other skin diseases, as well as syphilis, colic, and diarrhea. In cases of acute rheumatism, bark root oil can be used externally. Rheumatic aches are treated using leaves as a poultice [12].

• Plant Extraction

This systematic flow chart was designed in such a manner that the therapeutic development from selected plants. Therapeutic plants having consistent therapeutic effects remain important in today's natural and herbal drug development methods (Figure 4). Plants may be a primary source of biologically active or medicinal compounds, and these biological activities may be utilized to synthesize more complex semisynthetic molecules. According to extracted compounds from medicinal plants, plants can be used as bioactive markers during spectroscopic and chromatographic investigations, as well as the discovery of new medications.

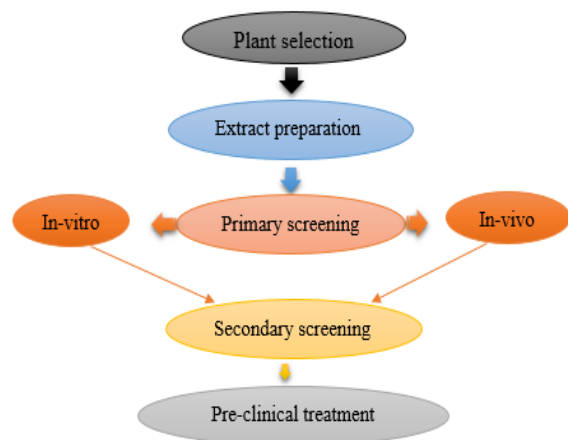


Figure 4: The systematic flow chart shows the therapeutic development from selected plants

2. LITERATURE REVIEW

R Gnanaraja et al. studied the biological activities substances found in medicinal plants have been used to treat a variety of human illnesses and serve an essential part in healing. Alkaloids, Flavonoids, Steroids, and Tannins are secondary components. Anticancer, antibacterial, antidiabetic, antidiuretic, and anti-inflammation properties are all found in therapeutic plants. The selected therapeutic plants samples were washed, allowed to dry, and crushed. The phytochemical analysis was performed on the ethanolic extract of leaf samples to determine the quantitative and qualitative phytochemical components in the plant extracts. The phytoconstituents of these therapeutic plants revealed the occurrence or nonappearance of alkaloids, flavonoids, Steroids, and Tannins, as well as their quantitative determination [13].

Abdul Wadood et al. studied the biological activities components found in therapeutic plants are used to treat a variety of human illnesses and serve an essential part in healing. Primary and secondary components are the two types of phytochemicals. Chlorophyll, proteins, sugar, and amino acids are the primary components. Terpenoids and alkaloids are secondary components. Antifungal, antibacterial, and anti-inflammatory properties are found in therapeutic plants. The major aim of this study was to see if any phytochemical components were present in all of the therapeutic plants that were chosen. The phytochemical study of these therapeutic plants revealed the presence of terpenoids, reducing sugar, flavonoids, and alkaloids in the aforesaid therapeutic plants [14].

Nagy Morsy studied the antispasmodics, emetics, antimicrobials, antipyretics, antidiarrheal, antioxidants, and anticancer agents that are all found in plants. Many of the plants are said to have beneficial qualities in herbal medicine and are widely utilized by indigenous people all over the world [15-19]. The evaluation and characterization of diverse plants and plant components against a variety of illnesses has been highlighted in research. The process of detecting, estimating, and extracting bioactive plant compounds has always been difficult. This study will present a summary of the most frequent types of medicinal chemicals and the easy and reliable procedures for qualitative and quantitative assessment. It provides a useful overview of biologically active components as well as ways for determining the significance of a plant as a source of biologically active chemicals [20].

Sudipa Nag studied the phytochemical analysis of leaves from several medicinal plants, such as *Andrographis paniculata* of the Acanthaceae family. On 90% of the Ethanolic extract of leaf powder, specific chemical colour reaction tests were used to determine the qualitative assessment of secondary metabolites such as starch, alkaloids, flavonoids, tannins, reducing sugars, amino acids, and lignin [21].

K.Sahira Banu and L. Cathrine studied the plants are valuable in the pharmaceutical manufacturing for their structural variety and vast range of pharmacological effects. Phytochemicals are the physiologically active substances found in plants. Phytochemicals come from a variety of plant components, including leaves, flowers, seeds, barks, roots, and pulps. These phytochemical analyses are utilized as direct therapeutic agents. They are used as a starting point for the development of more sophisticated semi-synthetic chemical substances. The gathering of plants, the extraction of active compounds from diverse sections of plants, and the qualitative and quantitative analysis of phytochemicals [22].

3. DISCUSSION

Antibiotic resistance in microorganisms and the rise of new infectious illnesses necessitate the creation of innovative, safe, and efficient antimicrobial chemicals. Antibiotic misuse has a significant influence in the development of drug resistance in pathogenic microorganisms. Microorganisms develop antibiotic resistance by changing their metabolic and genetic structure. As a result, scientists have been compelled to look for novel antibacterial compounds in unexpected places, such as medicinal plants. As a result, medicinal plants with antibacterial properties are gaining popularity nowadays. Many diseases, including bacteria and fungi, are becoming increasingly resistant to antibiotics, prompting the current study [23-27].

4. CONCLUSION

Certain plants are great sources of intermediates, which are used in the pharmaceutical manufacturing process. Purified active compounds are extracted from raw plant materials for use as drug intermediates in the production of semi-synthetic medications and standardized galenicals (extracts, powders, tinctures, etc.). As a result, enhancing methodologies for qualitative and quantitative medicinal plant determination is critical for quality evaluation in the medicinal plant business. Furthermore, phytochemical analysis provides a useful monitoring technique for seasonal variations in active components as well as during cultivation and harvesting, assisting in the collection of the most active elements. In order to improve the utilization of plants as the cheapest source of raw material in the pharmaceutical industry, further research

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into phytochemical analysis is needed. Phytochemical research on medicinal plants is also important and profitable for both research institutes and pharmaceutical companies looking to create new medications to cure a variety of diseases.

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