



A Taxonomical study of Apocynaceae family plant and their medicinal uses at Davangere University campus

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Abstract

The apocynaceae family is one of the most medicinally diverse families in the plant kingdom and is a rich source for drugs that have found use both traditionally and in conventional medicine. The medicinal activity of these plants was due to the presence of alkaloids which were either indoline alkaloids or steroidal alkaloids. The family Apocynaceae consists of tropical trees, shrubs and vines. Characteristic features of the family are that almost all species produce milky sap. In traditional medicine, Apocynaceae species are used to treat gastrointestinal ailments, fever, malaria, pain and diabetes, including skin and ecto-parasitic diseases. Some are important timber species while many are planted as ornamentals. Non-medicinal uses include food, poisons, fodder, wood, ornamentals, dye and perfume. A total of 4600 species under 415 genera belonging to the family Apocynaceae were collected and identified. Species of Apocynaceae have been reported to possess anticancer and antimalarial properties. Species having cytotoxic activity include those of Catharanthus, Nerium, Plumeria, Tabernaemontana and Ichnocarpus. Catharanthus roseus is the most medicinally important plant in this family due to its use in the treatment of various types of cancers, other agents that have been derived from this family include the alkaloids reserpine and rescinnamine which have been used against hypertension, and others are the cardiac glycosides. The Apocynaceae family and is a traditionally valuable medicinal plant that has been commonly used in the traditional medicinal system and contributes to the native healthcare system in various parts of the world. This family plants has renowned for its antibacterial and anticancer effects and its usage in the treatment of jaundice, diabetes, hypertension. All of the economically and medicinally essential plant parts of this species are used in the preparation of a potent cathartic. This plant has been extensively used in herbal medicine and has various important phytopharmacological properties. This plant has recently been involved in modern science.

Keywords: Activity, apocynaceae, medicinal plants, taxonomy, uses.

Introduction

Plant is an important source of medicine and plays a key role in world health. Medicinal herbs or plants have been known to be an important potential source of therapeutics or curative aids. The use of medicinal plants has attained a commanding role in health system all over the world. This involves the use of medicinal plants not only for the treatment of diseases but also as potential material for maintaining good health and conditions. Many countries in the world, that is, twothird of the world's population depends on herbal medicine for primary health care. The reasons for this is because of their better cultural acceptability, better compatibility and adaptability with the human body and pose lesser side effects1 . From records, most of the used drugs contain plant extracts. Different types of plants used to treat various types of diseases that reveal the most up to date findings in understanding of biological significance of their bioactive compounds used. Recently dramatic changes have taken place in the health care system of world population through the development of science, technology and medical science but till to day 400 crores of people of the world are totally dependent on herbal medicines2 . Human beings have depended on nature for their simple requirements as being the sources for medicines, shelters, food stuffs, fragrances, clothing, flavors, fertilizers and means of transportation throughout the ages3. For the large proportions of world's population medicinal plants continue to show a dominant role in the healthcare system and this is mainly true in developing countries, where herbal medicine has continuous history of long use. The development and recognition of medicinal and financial aids of these plants are on rise in both industrialized and developing nations4. Some contain active ingredients (bioactive components or substances) obtained from plants. Through recent researches, plant-derived drugs were discovered from the study of curative, therapeutic, traditional cures and most especially the folk knowledge of indigenous people and some of these claims and believe of people are irreplaceable despite the recent advancement in science and technology5.

In addition, in the USA, more than 40% of the population recently reported using complementary and alternative medicines, including botanical dietary supplements. In the past decade, a remarkable effort has been deployed leading to the isolation of many bioactive drugs from plants. Apocynaceae is a large family of flowering plants which includes trees, shrubs, herbs, stem succulents, and vines, commonly known as the dogbane family, (Greek for "away from dog" since some taxa were used as dog poison). The former family Asclepiadaceae (now known as Asclepiadoideae) is considered a subfamily of Apocynaceae8 and the Apocynaceae has 43 Genera and 170 species accepted taxa overall. But *Carissa carandas* L(Christ's Thorn), *Catharanthus roseus* (L.) G. Don (Periwinkle), *Nerium oleander* Linn. (oleander), *Plumeria alba* L. (pagoda tree), *Tabernaemontana divaricata* (L.) R. Br ex Roem.(wax flower), *Ichnocarpus frutescens* (L.) R. Br. (Black creeper) are important plants of this family because these plants shown different activity for different diseases. These plants have remarkable medicinal and traditional uses. Medicinal plants are very much related to our health culture. Most of the people of Bangladesh are directly or indirectly depends medicinal plants for health problem.

Catharanthus roseus L.

Systematic Position

Kingdom : Plantae
Division : Magnoliophyta (Flowering plants)
Class : Magnoliopsida (Dicotyledons)
Order : Gentianales
Family : Apocynaceae
Genus : *Catharanthus*
Species : *C. roseus* (*Vinca rosea*)
Binomial Name: *Catharanthus roseus* (L.) G. Don
Local name : Nayantara



Morphological description:

Habit: Herb or sub-shrub.

Habitat: Gardens where it is cultivated as an ornamental plant.

Flower colour: White and pink Flowering

Season: Flowering almost throughout the year.

Parts Utilized: Leaf, stem, root

Medicinal uses

- The plant has been used as a folk remedy for diabetes.
- The root is considered tonic and stomachic.
- Alkaloids also possess hypertensive, sedative and tranquillizing properties. They also cause relaxation of plain muscles and depression of the central nervous system.
- Leaves and latex are given for blood dysentery and piles.

Table 1: Chemical composition of *Catharanthus roseus* (L).

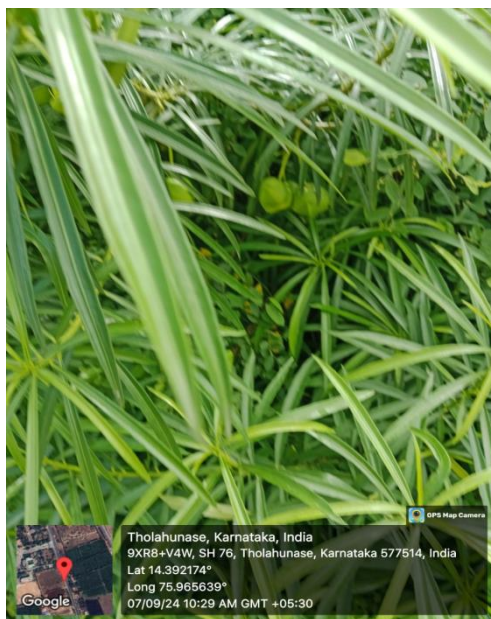
| Chemical Constituents | Activity |
|-----------------------|--|
| Vinblastine | It is a vinca alkaloid used to treat breast cancer, testicular cancer, neuroblastoma, Hodgkin's and non-Hodgkin's lymphoma, mycosis fungoides, histiocytosis, and Kaposi's sarcoma. |
| Vincristine | It is a vinca alkaloid used to treat acute leukemia, malignant lymphoma, Hodgkin's disease, acute erythraemia, and acute panmyelosis. |
| Vindesine | It is a vinca alkaloid derived from vinblastine used for various types of malignancies, but mainly acute lymphocytic leukemia. |
| Vincamine | It is a monoterpene indole alkaloid obtained from the leaves of <i>Vinca minor</i> with a vasodilatory property. Studies indicate that vincamine increases the regional cerebral blood flow. |
| Vinculin | as a treatment for diabetes |
| Vindoline | alkaloids shows anti-ulcer property |

Cascabela thevetia

Systematic Position

Domain : Eukaryota
Kingdom : Plantae
Phylum : Spermatophyta
Subphylum : Angiospermae
Class : Dicotyledonae
Order : Gentianales
Family : Apocynaceae
Genus : *Cascabela*
Species : *Cascabela thevetia*

- Botanical Name: *C.thevetia*
- Binomial Name: **Cascabela thevetia**



Morphological description:

Habit: Shrub

Habitat: Grows in the clayey, loamy and sandy soil

Flower : Yellow, funnel shaped

Flowering season: Flowering: January-July

Parts Utilized

Leaves, flowers, roots and seeds. Medicinal

Medicinal Uses

- All parts of the plants are poisonous.
- Leaf decoction is used to reduce swellings.

- Macerated leaves are used for itch and fall of hair.
- The flowers are good for inflammations, chronic pains in the muscles and the joints, lumbago, headache, and scabies.

Table 2: Chemical Composition of *Cascabela thevetia*

| Chemical Constituents | Activity |
|-----------------------|--|
| Thevetin B | Treat jaundice, fever, intestinal worms, and to treat violent headaches and colds. |
| Cannonigenol | antibacterial, antiviral, antifungal, anticancer, anti-inflammatory and antioxidant properties |
| Cannogenin | Antimicrobial Activity |
| Digitoxigenin | The treatment of heart failure. |

Plumeria alba L.

Systematic Position

Kingdom : Plantae
 Subkingdom : Tracheobionta
 Super division : Spermatophyta
 Division : Magnoliophyta
 Class : Magnoliopsida
 Sub class : Asteridae
 Order : Gentianales
 Family : Apocynaceae
 Genus : Plumeria

- Botanical Name: *P. alba L.*
- Binomial Name: *Plumeria alba L.*
- Local name: Kathgolap



Morphological description:

Habitat: Grown in rich, dry to medium moisture, coastal thickets and limestone forests. Flower colour: White, pink

Flowering season: May-November Mode of Action The stem bark were collected. This extract showed the antibacterial activity

Parts Utilized : Seed, leaves, flowers and roots.

Medicinal uses:

• In addition, the flowers are edible and eaten as fritters, while the heart of the wood is part of a traditional medical preparation taken as a laxative.

- The root bark is depurative and purgative, causing thirst. It is used in the treatment of herpes and syphilis.
- The root bark is used externally as a lotion on syphilitic ulcers, administered as powder macerated in sugar-water, wine.
- The latex from the stem is caustic. It is used for treating ulcers, darts (skin diseases) and scabies.
- The seeds are used in the treatment of dysentery.

Table 3: Chemical Composition of *Plumeria alba* L.

| Chemical Constituents | Activity |
|-----------------------|---|
| Plumericin | Inflammatory bowel diseases, vascular disease, inflammatory disorders, and cancer. |
| Plumieride | Anti-inflammatory, antioxidant, immunostimulatory, anticancer, anti-malarial, anti-dermatophytic, antimicrobial, anti-fungal, anti-viral, cytotoxic potential and insecticidal properties |
| Linalool | Antimicrobial, Anti-anxiety, Anti-inflammatory |

***Tabernaemontana divaricata* L.**

Taxonomical description

Kingdom : plantae
 Phylum : Tracheophyta
 Class : Magnolipsida
 Order : Gentianales
 Family : Apocynaceae
 Genus : ***Tabernaemontana***
 Species : ***divaricata***

- Botanical Name: ***T. divaricata*** (L.) R. Br ex Roem
- Binomial Name: ***Tabernaemontana divaricata*** (L.) R. Br ex Roem

Flower colour: White Flowering



Morphological description:

Habit: A small shrub with milky juice
 Leaves: Opposite, lanceolate
 Flowers: Snow white, fragrant at night.
 Flowering and fruiting time: July to september

Parts Utilized: Root, bark, leaves, sap and flowers.

Medicinal uses

- A decoction is used in the treatment of diarrhoea and abdominal complaints.
- The roots, leaves, and flowers are all used in the treatment of snake and scorpion poisoning. An infusion is applied as a remedy for jungle fever.
- The roots are used in modern medicine to treat hypertension, headache and scabies.

Table 3: Chemical Composition of *Tabernaemontana divaricata*. (L)

| Chemical Constituents | Activity |
|-----------------------|--|
| Voaharine | Upper respiratory problems, pain relief, skin problems, and cramps. |
| Voacristine | Treatment of psychotic ailments, drug addiction, and also serve as precursors for drug synthesis |
| Heyneanine | Treatment of infections, pain, injuries, and various diseases. |

Nerium indicum

Taxonomical description

Kingdom : Plantae
Subkingdom : Tracheobionta
Super division : Spermatophyta
Division : Magnoliophyta
Class : Magnoliopsida
Subclass : Asteridae
Order : Gentianales
Family : Apocynaceae
Genus : *Nerium*
Species : *Indicum*
Binomial Name : *Nerium indicum*



Morphological description:

Habit: evergreen shrub

Stem: Erect, woody, solid, branched,

Leaves: Simple, whorled

Flower: Bracteate or ebracteate, pedicellate, complete, hermaphrodite,

Parts Utilized: Roots and leaves

Medicinal uses:

Leaf juice extract is used as eye drops for relieve eye inflammation

Root paste is applied over the wounds.

Chemical Composition of *Nerium indicum*

| Chemical Constituents | Activity |
|-----------------------|--|
| Karabin | This is used in treatment of functional disorders of the heart, in cardiac insufficiency and skin diseases |
| Neriodorin | It is an efficient useful treatment in conditions like snake bites, ulcers, cardiac diseases, |

Conclusion

The present study is to explore medicinal aspects of this family and focusing on medicinal plants and their local uses for the healthcare. The ethnobotanical also point out some specific medicinal plant species and their properties to the local inhabitants who are unknown from value of medicinal plants in the environment. The use of herbal medicine for treatments is one component of balancing body systems. In conclusion, it was obtained that different plant of this family have showed different activities like antimicrobial, antioxidant, anti-bacterial, antidiabetic, antitumor, anti-inflammatory, anti-asthmatic activity, anticancer activity, anti-ulcer activity, wound healing activity, anti-convulsant activity, biological activity, anti-diarrheal activity, anti-pyretic activity ,pharmacological activity etc. in human being and animal.

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