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RESEARCH ARTICLE

CATHARANTHUS ROSEUS: ORNAMENTAL PLANT IS NOW MEDICINAL BOUTIQUE

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ABSTRACT:

India possesses a rich biodiversity of the medicinal plants that were still not explored completely. *Catharanthus roseus* is native to the Indian Ocean island of Madagascar. This herb is now common in many tropical and subtropical regions worldwide, including the southern United States. It is a popular ornamental plant found in gardens and homes across the warmer parts of the world. The need for the novel pharmaceutical products out from the plant has attained a great interest in the present research world due to the cost and the higher side effects that are associated with the chemically manufactured drugs. *Catharanthus roseus*, which is a potent medicinal plant many of the pharmacological actions. That is used to treat many of the fatal diseases. Alkaloids were the major phytochemical constituent of the above medicinal plant and have different types possessing various medicinal uses. This review highlights the marvelous properties of this plant.

Key words: periwinkle, vinca, alkaloids, catharanthus, Madagascar

INTRODUCTION:

Catharanthus roseus (L.) which is an important medicinal plant of the family Apocynaceae is used to treat many of the fatal diseases contains a virtual cornucopia of useful alkaloids, used in diabetes, blood pressure, asthma, constipation, and cancer and menstrual problem. There are about two common cultivars of *C. roseus* which is named on the basis of their flower colour that is the pink flowered "Rosea"

and the white flowers "Alba". *Catharanthus roseus* which is proudly known as the Madagascar periwinkle is found to be a species of *Catharanthus* native and also endemic to Madagascar. The synonyms of the plant name include *Vinca rosea*, *Ammocallis rosea* and *Lochnera rosea*, other English names occasionally used for the plant include Cape Periwinkle, Rose Periwinkle, Rosy Periwinkle and "Old Maid".¹



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History of *Vinca rosea*: ²

Peckolt, in 1910, described the use in Brazil of an infusion of the leaves to control hemorrhage and scurvy, as a mouthwash for toothache, and for the healing and cleaning of chronic wounds. In Europe related species have been used for the proprietary suppression of the flow of milk. In the British West Indies it has been used to treat diabetic ulcer and in the Philippines has been reported as being an effective oral hypoglycemic agent. More recently, Chopra *et al.* have reported that the total alkaloids possess a limited antibacterial activity as well as a significant and sustained hypotensive action. The hypoglycemic and antibacterial activities have not been confirmed, although one of the alkaloids isolated from this plant, ajmalicine, has been reported to possess transient depressor action on arterial blood pressure

Periwinkle” or *Catharanthus roseus* (Family Apocyanaceae), commonly known as “Nayantara” or “Sadabahar”, the word *Catharanthus* derives from the Greek language meaning "pure flower." While, *roseus* means red, rose or rosy.

Scientific classification: ³

Botanical Name(s): Vinca Rosea (*Catharanthus roseus*)

Family Name: Apocynaceae

Kingdom: Plantae

Division: Magnoliophyta (Flowering plants)

Class: Magnoliopsida (Dicotyledons)

Order: Gentianales

Family: Apocynaceae

Genus: *Catharanthus*

Species: *C. roseus*

Vernacular names:

- English: cayenne jasmine, old maid, periwinkle
- Hindi: sada bahar, sadabahar
- Kannada: batla hoo, bili kaasi kanigalu, ganeshana hoo, kempu kaasi kanigalu
- Malayalam: banappuvu, nityakalyani, savanari, usamalari
- Marathi: sadaphool, sadaphul, sadaphuli
- Sanskrit: nityakalyani, rasna, sadampuspa, sadapushpi
- Tamil: cutkattu malli, cutukattu malli, cutukattuppu
- Telugu: billaganneru
- Gujarati: Barmasi
- Bengali: noyontara

Morphology:

Catharanthus roseus is an evergreen subshrub or herbaceous plant growing to 1 m. tall. The leaves are oval to oblong, 2.5- 9.0 cm. long and 1- 3.5 cm. broad glossy green hairless with a pale midrib and a short petiole about 1- 1.8 cm. long and they are arranged in the opposite pairs. The flowers are white to dark pink with a dark red centre, with a basal tube about 2.5- 3 cm. long and a corolla about 2-5 cm. diameter with five petal like lobes. The fruit is a pair of follicles about 2-4 cm. long and 3 mm broad.

Geographical Distribution:

Catharanthus roseus is native to the Indian Ocean Island of Madagascar. In the wild, it is found to be an endangered plant and the main cause of their decline is the habitat destruction by the slash and burn agriculture however, it is now common in many tropical and subtropical regions worldwide, including the Southern United states.

Potentially Active Chemical Constituents: ⁴

Researchers investigating its medicinal properties discovered that it contained a group of alkaloids that, though extremely toxic, had potential uses in cancer treatment. Plants have the ability to synthesize a wide variety of chemical compounds that are used to perform important biological functions, and to defend against attack from predators such as insects, fungi and herbivorous mammals.

C. roseus posse's carbohydrate, flavinoid, saponin and alkaloids. Alkaloids are the most potentially active chemical constituents of *Catharanthus roseus*. More than 400 alkaloids are present in the plant, which are used as pharmaceuticals, agrochemicals, flavor and fragrance, ingredients, food additives and pesticides. The alkaloids like actineo plastidemic, Vinblastin, Vincristine, Vindesine, Vindeline Tabersonine etc. are mainly present in aerial parts whereas ajmalicine, vinceine, vineamine, raubasin, reserpine, catharanthine etc are present in roots and basal stem. Rosindin is an anthocyanin pigment found in the flower of *C. roseus*.

Folk medicinal uses:

- In India- The juice of leaves is used as application to bee sting/ wasp sting.
- In Philippines- Decoction of leaves is used in diabetes and decoction of young leaves is used in stomach cramps, root decoction is used for intestinal parasitism. Infusion of leaves is used for treating menorrhagia. Crude leaf extracts and root has anti cancer activity. Roots used for dysentery.
- In Madagascar- The bitter and astringent leaves are used as vomitive, roots used as purgative, vermifugl, depurative, hemostatic and toothache remedies.
- In Mauritius- The juice of leaves is used for indigestion and dyspepsia.
- In West Indies and Nigeria- The plant is used in diabetes.
- In Cuba and Jamaica- Flower extract is used for eye wash in infants.
- In Bahamas- Decoction of flower is used in asthma, tuberculosis and flautlence.
- In Malaysia- The plant is used in diabetes, hypertension, insomnia and cancer.
- In Hawai- Extract of boiled plant is used to arrest bleeding.
- In America- Gargle of plant is used to ease soarthroats, chest ailments and laryngitis.
- In Africa- Leaves are used for menorrhagia and rheumatism.

Catharanthus roseus is used in plant pathology as experiment host for phytoplasmas. This is because it is easy to infect with a large majority of phytoplasmas and also often has very distinctive symptoms such as phyllody and significantly reduced leaf size.

PHARMACOLOGICAL ACTIVITIES:

1. **Anti cancer activity:**^{5,6} The anticancer alkaloids Vinblastine and Vincristine are derived from stem and leaf of *Catharanthus roseus*. These alkaloids have growth inhibition effect to some human tumors. Vinblastine is used experimentally for treatment of neoplasmas and is recommended for Hodgkins disease, chorio carcinoma. Vincristine another alkaloids is used for leukemia in children. Different percentage of the methanolic crude extracts of *Catharanthus* was found to show the significant anticancer activity against numerous cell types in the *in vitro* condition and especially greatest activity was found against the multidrug resistant tumor types. Vinblastine is sold as Velban or Vincristine as oncovin.
2. **Anti diabetic activity:** The ethanolic extracts of the leaves and flower of *C. roseus* showed a dose dependent lowering of blood sugar in comparable to the standard drug. Lowering of blood sugar in comparable to the standard drug glibenclamide. The Hypo glycemc effect has appeared due to the result of the increase glucose utilization in the liver. The aqueous extract was found to lower the blood glucose of about 20% in diabetic rats when compared to that of the dichloromethane and methanol extracts which lowered the blood glucose level to 49-58%. The hypoglycemic effect has appeared due to the result of the increased glucose utilization in the liver. the hypoglycemic activity of alkaloids isolated from *C. roseus* have been studied pharmacologically and a remedy derived from the plant has been marketed under the propriety name Vinculin as a treatment for diabetes.⁷⁻⁹
3. **Anti microbial activity:** Crude extracts from different parts of the plant was tested for anti bacterial activity. Extract from leaves showed significantly higher efficacy. The anti bacterial activity of the leaf extract of the plant was checked against micro organism like *Pseudomonas aeruginosa* NCIM2036, *Salmonella typhimurium* NCIM2501, *Staphylococcus aureus* NCIM5021 and was found that the extracts could be used as the prophylactic agent in the treatment of many of the disease.¹⁰
4. **Anti oxidant property-** The anti oxidant potential of the ethanolic extract of the roots of the two varieties of *C. roseus* namely rosea (pink flower) and alba (white flower) was obtained by using different system of assay such as Hydroxyl radical-scavenging activity, uperoxide radical-scavenging activity, DPPH radical- scavenging activity and nitric oxide radical inhibition method. The result obtained proved that the ethanolic extract of the roots of Periwinkle varieties has exhibited the satisfactory scavenging effect in the entire assay in a concentration dependent manner but *C. roseus* was found to possess more antioxidant activity than that of *C. alba*.¹¹
5. **Anti helminthic activity:**¹² Helminthes infections are the chronic illness, affecting human beings and cattle. *Catharanthus roseus* was found to be used from the traditional period as an anti helminthic agent. The anti helminthic property of *C. roseus* has been evaluated by using *Pherithema postuma* as an experimental model and with Piperazine citrate as the standard reference. The ethanolic extract of the concentration of 250 mg/ml was found to show the significant anti helminthic activity.
6. **Anti ulcer property:** Vincamine and Vindoline alkaloids of the plant showed anti ulcer property. The alkaloid vincamine, present in the plant leaves shows cerebrovasodilatory and neuroprotective activity. The plant leaves proved for anti-ulcer activity against experimentally induced gastric damage in rats.¹³
7. **Hypotensive property:** Extract of leaves of the plant made significant change in hypotensive. The leaves have been known to contain 150 useful alkaloids among other pharmacologically active compounds. Significant antihyperglycemic and hypotensive activity of the leaf extracts (hydroalcoholic or dichloromethane-methanol) have been reported in laboratory animals.¹⁴
8. **Anti diarrheal property-** The anti diarrheal activity of the plant ethanolic leaf extracts as tested in the wistar rats with castor oil as a experimental diarrhea inducing agent in addition to the pretreatment of the extract. The anti diarrheal effect of ethanolic extracts *C. roseus* showed the dose dependant inhibition of the castor oil induced diarrhea.¹⁵
9. **Wound healing property:** Rats treated with 100 mg /kg/day of the *Catharanthus roseus* ethanol extract had high rate of wound contraction significantly decreased epithelization period, significant increase in dry weight and hydroxyproline content of the granulation tissue when compared with the controls. Wound contraction together with increased tensile strength and hydroxyproline content support the use of *C. roseus* in the management of wound healing.¹⁶
10. **Hypolipidimic effect:** In study, significant anti atherosclerotic activity as suggested by reduction in the serum levels of total cholesterol, triglycerides, LDL-c, VLDLc and histology of aorta, liver and kidney with the leaf juice of *Catharanthus roseus* (Linn.) G. Donn. could have resulted from the antioxidant effect of flavonoid, and probably, vinpocetine like compound present in leaf juice of *Catharanthus roseus* (Linn.) G. Donn.¹⁷
11. **Memory enhancement activity:** Vinpocetine has been reported to have a variety of actions that would hypothetically be beneficial in Alzheimer's disease (AD). The only study investigating this agent in a well-defined cohort of AD patients found no benefit. Meta-analysis of older studies of

vinpocetine in poorly-defined dementia populations concluded that there is insufficient evidence to support its clinical use at this time. Vinpocetine has been well tolerated at doses up to 60 mg/d in clinical trials of dementia and stroke, and no significant adverse events.¹⁸

CONCLUSION:

Medicinal plant is the most exclusive source of life saving drugs for majority of the world's population. They continue to be an important therapeutic aid for alleviating the ailments of human kinds. The search for defence mechanism, longevity and remedies to relieve pain and discomfort drove early man to explore these immediate natural surroundings. It led to the use of plants, animal products and minerals etc., and the development of a variety of therapeutic agents. Today, there is a renewal interest in traditional medicine and an increasing demand for more drugs from plant sources because green medicine is safe and more dependable than costly synthetic drug, many of which have adverse

side effects. *Catharanthus roseus* was investigated from the ancient time for their phytochemical components and their therapeutic effect. The plant contains enormous phytochemical constituents of various medicinal applications. Vinca Alkaloids has set a milestone in the History of Modern Medicine. A little of its usage in medicine has been established by numerous studies still more of its hidden properties are yet to be explored. Hence most work could be done on the above plant to reveal the unknown mysteries which would help the need of the present pharmaceutical world. Hope this review will serve the purpose of aiding in future Research work to unleash the further components present in *Vinca rosea*.

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