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Ethnobotanical Importance And Therapeutic Benefits Of *Catharanthus Roseus*

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Abstract-

India has a diverse range of medicinal plants that have not yet been fully studied. The traditional Indian medical system known as Ayurveda focuses the therapeutic benefits of herbs. The demand for new pharmaceutical goods derived from plants has sparked a lot of interest in the current research community because chemically made pharmaceuticals are more expensive and have more adverse effects. *Catharanthus roseus* has good Ayurvedic recognition. The anti-microbial, anti-sterility, anti-tumor, anti-diabetic, anti-oxidant and anti-mutagenic properties of this substance are well-known. It is also used to treat many of fatal disease. This evergreen plant originally came from the Madagascar islands. The leaves are placed in opposite pairs, and the flowers can range in pink to purple color. The main phytochemical component of the *Catharanthus roseus* was alkaloids, which come in a variety of forms like vinceine, raubasin, ajmalcin, resperine, vincristine and vinblastine with a range of therapeutic applications. Because of its endangered status, it must be protected. In this review, an attempt has been made to summarize the ethnomedicinal value of the above plant against various diseases in a precise way to help the learners to understand the basis medicinal value of the plant.

Keywords: *Catharanthus roseus*, Alkaloids, Apocynaceae, Monoterpenoid, Ethnomedicinal

Introduction-

Ayurveda is traditional health care system using various plant drugs is successful from very early times in various disorders for healthy life and longevity^[1]. Ethnobotanical data on medicinal plants and how indigenous societies use them is helpful for medication discovery, biodiversity preservation, community health care and traditional cultural preservation. An essential member of the Apocynaceae family, *Catharanthus roseus* L. (G.) Don is used to treat a number of deadly diseases. *C. roseus* is a dicotyledonous angiosperm plant. The word "*Catharanthus*" comes from the Greek word meaning "pure flower." On the other hand, *roseus* denotes rosy, red, or rose^[2]. About two common cultivars of *C. roseus* are named by their flower colors: the white-flowered "Alba" and the pink-flowered "Rosea"^[3]. One species of *Catharanthus*

that is native and endemic to Madagascar is *Catharanthus roseus*, which is proudly known as the Madagascar periwinkle. This plant is an erected procumbent herb or under the shrub containing latex.

Numerous pharmacological activities of this plant have been discovered, including antiviral, antifungal, antioxidant, and anticancer effects^[4]. Related species have been used in Europe to control the flow of milk in a proprietary manner. 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.

Chopra *et al.* have reported that the total alkaloids possess a limited antibacterial activity as well as a significant and sustained hypotensive action. Vinblastine and vincristine are two terpene indole alkaloids that are used for treating cancer and are produced by this plant^[5].

Taxonomy^[6].

Scientific Classification	
Domain	Eukarya (eukaryotes)
Kingdom	Plantae (plants)
Subkingdom	Tracheobionta (vascular plants)
Superdivision	Spermatophyta (seed plants)
Division	Magnoliophyta (Flowering plants)
Class	Magnoliopsida (Dicotyledons)
Subclass	Asteridae
Superorder	Gentiananae
Order	Gentianales
Family	Apocynaceae (Dogbane)
Subfamily	Rauvolfioideae
Tribe	Vinceae
Genus	<i>Catharanthus</i>
Species	<i>C. roseus</i>
Botanical Name(s)	<i>Catharanthus roseus</i> (Linnaeus) G. Don.

Vernacular Names^[7].

Language	Common Name
English	Periwinkle, cayenne jasmine, old maid
Hindi	Sadabahar
Rajasthani	Sadabahar
Sanskrit	Rasna, sadampuspa, nityakalyani, sadapushpi
Gujarati	Barmasi
Bengali	Noyontara
Kannada	Kempukaasikanigalu, bilikaasikanigalu, batlahoo, ganeshanahoo
Malayalam	Banappuvu, nityakalyani, savanari, usamalari
Marathi	Sadaphool, sadaphul, sadaphuli
Tamil	Cutkattumalli, cutukattumalli, cutukattuppu
Telugu	Billaganneru

Morphological Characters-

Catharanthus roseus is a herbaceous or evergreen sub-herb that can reach a height of one meter. The leaves are grouped in opposite pairs and are oval to oblong, 2.5–9.0 cm long, 1-3.5 cm wide, glossy green, hairless, with a pale midrib and a short petiole that is roughly 1-1.8 cm long. The flowers have a rich red core and range in color from white to dark pink. The corolla has five lobes that resemble petals and is around 2–5 cm in diameter, while the basal tube is roughly 2.5–3 cm long. The fruit consists of two follicles that are roughly 2-4 cm long and 3 mm wide. (Frode and Medeiros,2008)



Figure 1: *Catharanthus roseus* (Plant body, Flower, Leaf, Stem)

Plant Part Used: Stem, Root, Leaves & Flower petal.

Plant Geographical Distribution-

Madagascar, an island in the Indian Ocean, is home to *Catharanthus roseus*. Although it is considered an endangered plant in the wild. The primary factor contributing to its decline in the wild is habitat damage by slash-and-burn agriculture, which has made it an endangered plant. Despite this, it is now widespread in many tropical and subtropical locations across the world^[8], including the southern United States. With white to dark pink flowers, it is a herbaceous plant or evergreen sub-shrub that reaches a height of approximately

one meter^[9]. This plant is widely distributed across India, thriving in diverse climates and soils. It grows in southern states like Tamil Nadu, Kerala, and Karnataka, and extends to arid regions like Rajasthan and Gujarat. The plant is common in gardens, roadsides, and degraded lands due to its resilience.

Phytochemical Substances and Their Therapeutic Applications-

The alkaloids, flavonoids, saponins, and carbohydrates are found in *Catharanthus roseus* and major potentially active chemical ingredients are alkaloids in this plant. The plant contains about 130 alkaloids, which are utilized as insecticides, food additives, flavorings, fragrances, agrochemicals, and medications. The majority of alkaloids, such as vinblastine, vincristine, vindesine, vindelinetabersonine, actineoplastidemic etc., are found in the aerial portions, whereas the roots and basal stem include ajmalicine, vinceine, vineamine, raubasin, reserpine, catharanthine, etc. The anthocyanin pigment also known as rosindin is present in *C. roseus* flowers^[10].

Researchers looking into its therapeutic qualities found that it included a class of alkaloids that, despite their severe toxicity, may be used to treat cancer. The alkaloids extracted from *C. roseus* have been shown to have sedative, hypotensive, calming, and anti-cancer effects. The plant has long been used to treat wasp stings, central nervous system depression, and muscle soreness. Plants may produce an incredible variety of chemical compounds that are utilized for vital biological processes as well as defense against predators including insects, fungus, and herbivorous mammals. Also it's utilized for treat oral ulcers, sore throats, bleeding gums, and nosebleeds. It has also been used internally to treat conditions like memory loss, high blood sugar, cystitis, gastritis, diarrhea, and enteritis^[11]. Among its many uses are stomachic, anti-diabetic, cancer prevention, and cancer treatment^[12].

ANTIOXIDANT ENZYME ACTIVITIES

To find out how the antioxidant enzyme activities of alba and rosea cultivars of *Catharanthus roseus* (L.) G. Don. an experiment was conducted in pot culture changed in response to varying sodium chloride (NaCl) concentrations at different growth stages. In particular, the antioxidant potential of the enzymes catalase (CAT), peroxidase (POX), and superoxide dismutase (SOD) was examined. The outcome demonstrated that SOD activity was observed to be elevated at 50 mM NaCl but decreased at increasing treatment concentrations. At 25 mM NaCl, there were no discernible changes in POX activity; however, at subsequent, higher NaCl concentrations, there were notable increases in this activity. According to the results of the experiment mentioned previously, *C. roseus* is a plant that is best suited for growing in regions that are impacted by salt and yields plants with higher levels of antioxidants and therapeutic benefits^[13].

ANTI-CANCER ACTIVITY

In vitro, it was discovered that varying percentages of *Catharanthus* methanolic crude extracts had strong anticancer activity against a variety of cell types, with the highest activity being observed against tumor types that were resistant to multiple drugs^[14,15]. The stem and leaves of *Catharanthus roseus* are the source of the anticancer alkaloids vinblastine and vincristine. Certain human cancers can be inhibited in their growth by these alkaloids. Vinblastine is advised for Hodgkin's disease and choriocarcinoma and is used experimentally to treat neoplasms. Vincristine alkaloids, is used to treat childhood leukemia. As oncovin, vinblastine is marketed as Velban or vincristine.

ANTINEOPLASTIC AND ANTIDIABETIC ACTIVITY

Ethanollic extracts of *Catharanthus* leaves and flowers have been shown in numerous animal tests to reduce blood glucose levels^[16,17]. When compared to the dichloromethane and methanol extracts, which decreased the blood glucose level to 49–58% in diabetic rats, the aqueous extract was observed to reduce the blood glucose by roughly 20%^[18]. Alkaloids extracted from *C. roseus* have been examined pharmacologically for their hypoglycemic properties, and a plant-based medication called Vinculin has been sold as a diabetes therapy.^[19]

ANTI-MICROBIAL ACTIVITY

Since the majority of bacterial infections were becoming resistant to many of the antimicrobial medications that were on the market, *Catharanthus roseus* is proven to be a significant medicinal plant for the creation of innovative pharmaceuticals. The antibacterial properties of crude extracts from various plant sections were examined. The effectiveness of the leaf extract was noticeably higher. The plant's leaf extract was tested for antibacterial activity against microorganisms such as *Salmonella typhimurium* NCIM2501, *Pseudomonas aeruginosa* NCIM2036, and *Staphylococcus aureus* NCIM5021. The results showed that the extracts could be used as a preventative measure in the treatment of numerous diseases^[20].

ANTHELMINTHIC ACTIVITY

Infections with helminthes are chronic diseases that impact both humans and cattle. *Catharanthus roseus* has been utilized as an anthelmintic agent since ancient times. Using *Pherithema posthuma* as an experimental model and piperazine citrate as the standard reference, the anthelmintic properties of *Catharanthus roseus* have been assessed. At a dosage of 250 mg/ml, the ethanolic extract demonstrated considerable anthelmintic action, with a death time of 46.33 minutes, while the reference medication at 50 mg/ml demonstrated a death time of 40.67 minutes. This study confirmed *Catharanthus roseus*' ethno-medical claims to be an anthelmintic herb^[21].

A MEMORY-BOOSTING ACTIVITY

Vinpocetine has been reported to have a variety of actions that would hypothetically be beneficial in Alzheimer's disease (AD). The sole trial that looked into this drug in a specific group of AD patients found no advantages. There is currently not enough data to justify the clinical use of vinpocetine, according to a meta-analysis of previous research on the drug in populations with poorly characterized dementia. There have been no notable side effects from vinpocetine at doses up to 60 mg/d in clinical trials for dementia and stroke^[22].

WOUND HEALING ACTIVITY

Increased tensile strength, hydroxyproline content, and wound contraction all lend support to the use of *C. roseus* in wound healing management^[23]. In comparison to the controls, 100 mg/kg/day of *Catharanthus roseus* ethanol extract showed a high rate of wound contraction, a much shorter epithelization period, a considerable rise in dry weight, and a higher hydroxyproline content in the granulation tissue.

ANTI HYPERGLYCEMIC ACTIVITY

Rats with normal blood sugar and rats with Alloxan induced diabetes were used to assess the effects of daily oral administration of 500 mg/body weight of *Catharanthus roseus* (CR) leaf dichloromethane: methanol (1:1) extracts for 20 days. The test animals' body weight significantly increased while their blood glucose, urea and cholesterol levels significantly decreased as a result of the extract. Hepatic enzymes including

hexokinase showed a rise in activity, while fructose 1, 6 bis-phosphatase and glucose-6-phosphatase showed a notable drop^[24].

ANTIDIARRHEALACTIVITY

In addition to preparing the extract, the Wistar rats were given castor oil as an experimental diarrhea inducer to investigate the in vivo antidiarrheal activity of the ethanolic leaf extract of *C. roseus*. The standard medications were atropine sulphate and loperamide. When administered at 200 and 500 mg/kg, the ethanolic extract of *C. roseus* demonstrated a dose-dependent reduction of castor oil-induced diarrhea^[25].

CONCLUSION-

A variety of innovative pharmaceutical medicines with strong pharmacological effects on humans were derived from medicinal plants. Rather than employing chemical medications that have adverse side effects, traditional medicine might be investigated to find new medicinal compositions that are less harmful, more cost-efficient and more effective. With the use of modern technology and instruments, the effects of many old medications might be further demonstrated, even though their underlying mechanisms were not fully understood when they were used. Finding the active ingredient that causes the pharmacological action is quite simple, and with the right approval from the relevant organizations, the medicine product itself may be sold. *Catharanthus roseus* is one of the important medicinal plants found. Since ancient times, the aforementioned plant has been studied for its medicinal effects and phytochemical components. It is used to treat a variety of diseases including leukemia, mouth ulcers, diabetes, and sore mouth. About 130 alkaloids, including ajmalicine, vinceine, raubasin and reserpine are produced by it. Additionally, the plant has a number of properties, including antioxidant, antibacterial, anthelmintic, anti-feedant, anti-sterility, antidiarrheal, and antidiabetic properties. To help meet the needs of the modern pharmaceutical industry, more research on the *Catharanthus roseus* plant could be conducted in order to uncover its hidden mysteries.

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