Vinca Roseus: An extensive Review focused on Recent Studies

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ABSTRACT

The Apocynaceae family includes the important medicinal plant Vinca rosea, also called Madagascar periwinkle (syn. Catharanthus roseus). Vincristine and vinblastine, two of its valuable alkaloids, are well known for their strong anticancer properties and are used to treat leukemia, Hodgkin's lymphoma, and other cancers. Numerous pharmacological properties of vinca rosea include anti-inflammatory, anti-cancer, anti-hypertensive, and antioxidant properties. Both decorative and medicinal uses are pursued for this plant, which grows well in tropical and subtropical climates. Numerous studies in pharmacology and phytochemistry continue to emphasize Vinca rosea's significance as a source of bioactive compounds for contemporary medicine and drug development. The techniques employed to study Vinca roseus vary depending on the goal of the study; for instance, phytochemical screening, pharmacological assessment, or active compound extraction. All things considered, Vinca roseus is a great source of naturally occurring bioactive compounds and is still used extensively in drug development and pharmaceutical research. Its medicinal potential for future therapeutic use can be further unlocked with the aid of sustainable cultivation and additional research. Medicinal plants were a powerful source of many innovative pharmaceutical products that have a strong pharmacological impact on people. Ancient medicine could be investigated to find new drug formulations that are more cost-effective, have fewer side effects, and are more effective than chemical drugs that cause side effects.

Keyword: *Vinca Roseus, Cantharanthus, Vinblastine, Vincristine, anticancer, Medicinal plant*

1. Introduction:

Vinca roseus, also called Catharanthus roseus, is a significant ornamental and therapeutic plant in the Apocynaceae family. It is also referred to as Madagascar periwinkle, rose periwinkle, or sadabahar. It comprises a number of natives to Europe, North Africa, and Southwest Asia species of evergreen, herbaceous, and subshrub plants. Vinca major (greater periwinkle) and Vinca minor (lesser periwinkle) are the two most widely recognized species. Originally from Madagascar, this perennial herb or sub-shrub is now widely grown in tropical and subtropical climates worldwide. This plant is well-known for its medicinal value in addition to its lovely pink, white, or red blooms. It produces a number of alkaloids, such as vincristine and vinblastine, which are used to treat a variety of cancers, including Hodgkin's lymphoma and leukemia. Vinca roseus is a common choice for gardens and landscaping because it grows well in warm climates and can withstand drought and poor soils. In addition to its therapeutic benefits, it is prized for its low maintenance needs and perpetual bloom. Vinblastine and vincristine, two complex terpenoid indole alkaloids that are essential in the chemotherapy of many cancers, are abundant in this plant, which is well-known for its glossy green leaves and pink, white, or carmine red flowers.

The process for Vinca rosea (Madagascar periwinkle) varies according to the objective, ranging from compound extraction to cultivation and propagation. To separate substances like alkaloids, flavonoids, and tannins, common extraction techniques include solvent-based processes like maceration or the use of a Soxhlet apparatus with solvents like methanol, ethanol, or a combination of ethanol and ethyl acetate. Growing from cuttings in well-drained soil in a spot that receives partial to full sun, with enough water and organic fertilizer, is the standard cultivation method. In agriculture, it entails planting seeds at a precise density and distance apart, then moving the seedlings. Common techniques for phytochemical extraction involve grinding and drying leaves, then extracting compounds with solvents like ethanol or acid, and then concentrating the compounds.

1.1 Scientific Classification

- **Botanical name:** Vinca Roseus (Catharanthus Roseus)
- **Family name:** Apocyanaceae
- **Kingdom:** Planteae
- **Class:** Magnoliospida (Dicotyladons)
- **Order:** Gentianles
- **Genus:** Cantheranthus
- **Species:** C.roseus

Fig.1. Vinca Roseus (Catharanthus Roseus)

1.2 Vernacular name:

- **Marathi:** Sadaphul,sadaphuli
- **English:** Sadaphuli, sadaphul
- **Hindi:** Sadabahar
- **Gujarati:** Barmasi

2. Nutritional value of vinca Roseus:

A moderate amount of protein (about 5.2 g/100g) and carbohydrates (about 46–76 g/100g), giving it a moderate nutritional value. In addition, it has a small amount of vitamin C—not enough to meet the recommended daily allowance—and calories (approximately 354–369 kcal/100g). Its main nutritional value is as a source of strong bioactive substances known as vinca alkaloids, which are used in chemotherapy.

3. Bioavailability and metabolism of Vinca Roseus:

The complex pharmacokinetic profiles of the vinca alkaloids obtained from Catharanthus roseus (formerly Vinca rosea) are marked by extensive metabolism and low bioavailability. Due to their limited oral bioavailability, vinblastine and vincristine—the two most clinically significant alkaloids—are mainly given intravenously to treat cancer.

4. Beneficial effect of Vinca Roseus:

Vinca rosea, sometimes referred to as Madagascar periwinkle or Catharanthus roseus, is a plant with a variety of therapeutic uses, but it is especially prized for its potent anti-diabetic and anti-cancer compounds. Alkaloids, flavonoids, and tannins are among the active phytochemicals found in the plant that give it its many medicinal benefits.

5. Adverse effect of Vinca Roseus:

Vinca rosea, sometimes referred to as Catharanthus roseus or Madagascar periwinkle, is extremely toxic and can have fatal consequences if consumed. Poisonous vinca alkaloids, which are strong substances found in chemotherapy medications like vincristine and vinblastine, are found in the plant. The entire plant is thought to be toxic. The Louisiana State Act 159 mentions C. roseus (under its synonym Vinca rosea) as being extremely toxic if taken orally by humans. The plant is poisonous in all parts.

6. Vinca Roseus -Drug interactions:

Vincristine, Vinblastine, Vidnesine and other Active alkaloids found in vinca Roseus have important pharmacological effect particular anti- neoplastic (anti-cancer) effect.

6.1. Chemotherapeutic Drug Interactions Additive toxicity: Vinca roseus alkaloids may intensify bone marrow suppression, neurotoxicity, or gastrointestinal adverse effects when paired with other cytotoxic agents (such as doxorubicin, cisplatin, or paclitaxel).

6.2. Interaction with medications that lower blood pressure:

Certain extracts might have hypotensive effects, which could intensify the effects of antihypertensive drugs and result in low blood pressure or vertigo.

7. Vinca Roseus –based Formulation and Patent:

The most popular and effective formulations use concentrated and purified vinca alkaloids to treat cancer. Vinca rosea and its constituents are the subject of patents that range from particular drug formulations to extraction techniques. These patents frequently concentrate on separating, purifying, or combining the active ingredients in the plant in new ways.

8. Market scenario of Vinca Roseus:

By 2032, the global vinca alkaloid API/extract market is expected to have grown from its 2024 valuation of approximately US$110 million to approximately US$191 million. CAGR during that time was about 7.8%. According to a different source, the global vinca alkaloids drug market is expected to reach US$2.21 billion in 2024 and US$3.58 billion by 2035, with a compound annual growth rate (CAGR) of approximately 4.5 to 5%. Asia-Pacific, particularly China and India, is a significant producer of APIs and raw materials like leaves. China is frequently mentioned as having between 50 and 53 percent of the world's supply and production of vinca alkaloid compounds. North America and Europe come next.

9. Conclusion and prospect:

Vinca roseus is still a vital medicinal plant with important pharmacological qualities, most notably its alkaloids that fight cancer. Current research supports its traditional uses for a variety of conditions, including diabetes and hypertension, and has found potential uses as an antioxidant, antimicrobial, and wound healer. Vinca roseus's future depends on cutting-edge genetic and biotechnological research that aims to get past these obstacles and produce more potent, long-lasting, and effective medicinal agents.

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11. Declaration of Competing interests:

The authors declare that none of the work described in this paper could have been influenced by any known competing financial or personal relationships.

12. Reference:

1. Ajaib M, Khan ZUD, Khan N, and Wahab M. Ethnobotanical investigations on beneficial shrubs in Azad Jammu's District Kotli
2. Banskota AH. Vietnamese medicinal plants' antiproliferative properties.
3. Wang S, Zheng Z, Weng Y. Chinese medicinal herbal extracts' angiogenesis and anti-angiogenesis properties. Life Science, 74(20):2467-78, 2004.
4. Singh SN, Vats P, Suri S. Impact of Catharanthus roseus antidiabetic extract on enzymatic activity in streptozotocin induced diabetic rats. 2001; 76:269-77; Journal of Ethnopharmacology.
5. Lochnera rosea as a possible source of hypotensive and other remedies (Pillay PP, Nair CPM, Santi Kumari TN). Bulletin of the University of Kerala's Research Institute, 1959, 1:51–54.

6. Vinpocetine's protective effect against experimentally induced gastric damage in rats was reported by Babulova A, Machova J, and Nosalova V. Research on Arzneimittel. 2003; 43:981-985.
7. Anderson M, Pereira LMP, and Nayak BS. Assessment of Catharanthus roseus leaf extract's capacity to heal wounds in rats. Fitoterapia. 78:540-544, 2007.
8. Yogesh Patel et al. Assessing the hypolipidemic potential of Catharanthus roseus leaf juice (Linn. Drug Research, Acta Poloniae Pharmaceutica, 2011; 68(6):927-935.
9. Sekar P. Vedic hints for improving memory. The Hindu, 1996
10. Ayesha Tazeen, Saloni Bisoyi, Nikkita Chettri, Simi Jacob, Swati Agarwal, Vedamurthy AB, et al. Assessment of Catharanthus roseus Extract's In-vitro Anthelminthic Activity. 2011; 3(3):211 213; International Journal of Pharmaceutical Sciences and Drug Research
11. Chattopadhyay RR. A comparative analysis of a few plant-based blood sugar lowering medications. 1994; 67:367-72; Journal of Ethnopharmacology.
12. Erdogrul. Some plant extracts used in traditional medicine have antibacterial properties. Biol. Pharm. 2002; 40: "Effect of Vinca rosea extracts in treatment of alloxan diabetes in male albino rats" by Ghosh S. and Suryawanshi SA. 748–759 in Indian Journal of Experimental Biology 39.8 (2001).
13. "An Updated Review on Catharanthus Roseus: Phytochemical and Pharmacological Analysis" by Asma N. et al. Journal of Pharmacy and Science Research in India 3.2 (2016): 631-653.
14. Vijaya Geetha, B., and Padmini, E. (2007). Catharanthus roseus has the ability to improve the altered antioxidant status in rats with experimentally induced diabetes. 264–270 in Journal of Ethnopharmacology, 109(2).
15. Qureshi, R., Nisar, M., and Tariq, S. A. (2018). Catharanthus roseus's phytochemical and pharmacological potential: a review. Pharmacotherapy & Biomedicine, 108, 129–137.
16. Kumar, M., and A. K. Verma (2011). A review of Catharanthus roseus (L.) G. Don's therapeutic applications. Innovative Pharmaceutical Sciences and Research International Journal, 2(5), 456–464.
17. Gopi, R., Jaleel, C. A., and Panneerselvam, R. (2009). A possible herbal medication for the treatment of cancer is Catharanthus roseus. 47(1), 10–23; International Journal of Experimental Biology.
18. WHO, the World Health Organization (1999). Volume 1 of Monographs on Selected Medicinal Plants. WHO, Geneva. (Includes Catharanthus roseus profile.)
19. Chaukhambha Bharati Academy, Varanasi, Sharma Pv Dravyagina Vijnana, 1969; 2:831-32.