

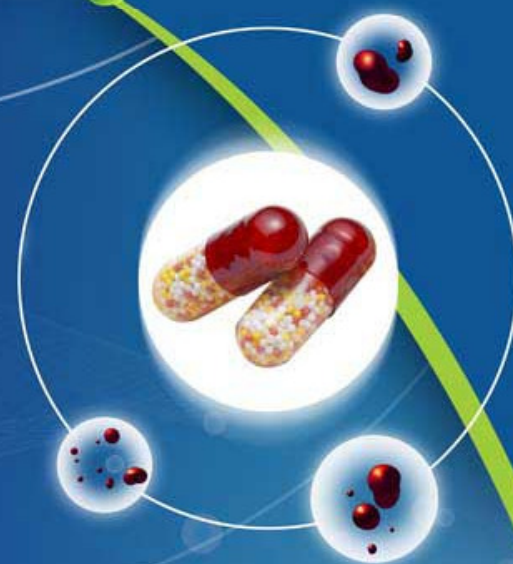


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Review Article

PHARMACOLOGICAL PROFILE OF CATHARANTHUS ROSEUS (APOCYNACEAE) - A DETAILED REVIEW**Jony Mallik ^{*1}, Hafsha Begum Chowdhury ², Abdullah Al Faruq ¹, Sourav Das ¹**¹ Department of Pharmacy, Southern University Bangladesh, Chittagong² Department of Pharmacy, University of Science & Technology Chittagong (USTC)**Received: 20 April 2013,****Revised and Accepted: 30 April 2013**

ABSTRACT

The main goal of this review is to make a proper status of about the pharmacological activity of *Catharanthus roseus* (Apocynaceae). *Catharanthus roseus* is a very useful medicinal plants that are growing at the different districts of Bangladesh. The local or bangla name of *Catharanthus roseus* is Noyantara. *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. The distinct part this plant may possess different pharmacological activity to the human being. The plant contains about 130 alkaloids, out of which 25 are dimeric in nature. Two of the dimeric alkaloids vinblastine and vincristine mainly present in the aerial parts, have found extensive application in the treatment of human neoplasm. The present article attempts to provide comprehensive information on pharmacological properties of *Catharanthus roseus* for further potential research. All the information has been collected from the published research paper on *Catharanthus roseus* as for the sake of future phytochemical or pharmacological research on it.

Key Words: *Catharanthus roseus*, Noyantara, Alkaloids, Pharmacological activity.

INTRODUCTION

The word *Catharanthus* derives from the Greek language meaning "pure flower." While, *roseus* means red, rose or rosy. Thus, resulting in how the Madagascar Periwinkle has also been given the name the "rosy" periwinkle. *Catharanthus roseus*, the Madagascar periwinkle or rosy periwinkle, is an attractive small subshrub with graceful pink or white salver form flowers. Native to southeastern and eastern Madagascar, the plant is easily cultivated, and European colonists exported it widely as an ornamental.

It is now grown almost worldwide, and is found naturalized in most tropical and subtropical regions following escapes from cultivation. Madagascar periwinkle was used in Madagascar, and in many of the countries to which it was later spread, as a folk treatment for diabetes. Researchers investigating its medicinal properties discovered that it contained a group of alkaloids that, though extremely toxic, had potential uses in cancer treatment. Two of these alkaloids, vincristine and vinblastine, can be used in purified form to treat common types of leukemia and lymphoma. The discovery of vincristine is credited with raising the survival rate of childhood leukemia from under 10% to over 90%. Thousands of children's lives have therefore been saved by an extract of this humble garden plant. Plants have the ability to synthesize a wide variety of chemical

***Corresponding Author**

Jony MallikDepartment of Pharmacy, Southern University
BangladeshEmail: jonypharmapub@gmail.com

Cellular: +8801830144424

compounds that are used to perform important biological functions, and to defend against attack from predators such as insects, fungi and herbivorous mammals. Many of these phytochemicals have beneficial effects on long-term health when consumed by humans, and can be used to effectively treat human diseases. At least 12,000 such compounds have been isolated so far; a number estimated to be less than 10% of the total. Chemical compounds in plants mediate their effects on the human body through processes identical to those already well understood for the chemical compounds in conventional drugs; thus herbal medicines do not differ greatly from conventional drugs in terms of how they work. This enables herbal medicines to be as effective as conventional medicines, but also gives them the same potential to cause harmful side effects. The use of plants as medicines predates written human history. Ethnobotany (the study of traditional human uses of plants) is recognized as an effective way to discover future medicines. In 2001, researchers identified 122 compounds used in modern medicine which were derived from "ethnomedical" plant sources; 80% of these have had an ethnomedical use identical or related to the current use of the active elements of the plant.[1-5] Many of the pharmaceuticals currently available to physicians have a long history of use as herbal remedies, including aspirin, digitalis, quinine, and opium. The use of herbs to treat disease is almost universal among non-industrialized societies, and is often more affordable than purchasing expensive modern pharmaceuticals. The World Health Organization (WHO) estimates that 80 percent of the population of some Asian and African countries presently use herbal medicine for some aspect of primary health care. Studies in the United States and Europe have shown that their use is less common in clinical settings, but has become increasingly more in recent years as scientific evidence about the effectiveness of herbal medicine has become more widely available.

Plant Profile

Catharanthus roseus is a fleshy perennial growing to 32 in (80 cm) high. It has glossy, dark green, oval leaves (1-2 inches long) and flowers all summer long. The blooms of the natural wild plants are a pale pink with a purple "eye" in their centers.

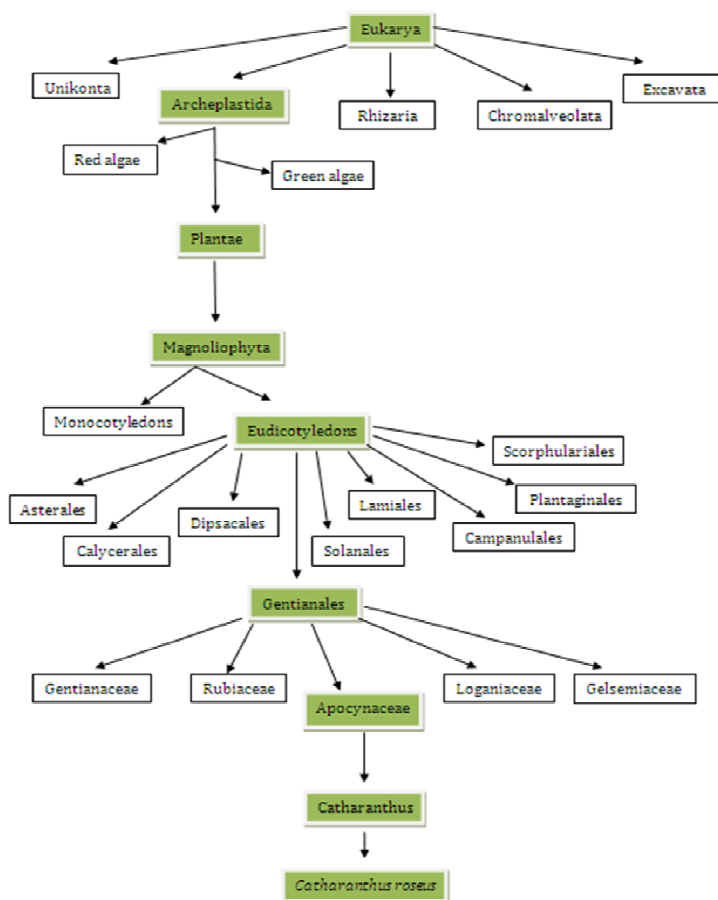
Medicinal Uses

Catharanthus roseus is useful to treat many diseases. Long before modern researcher learned of the plant's valuable and varied properties, people in faraway places were using the Madagascar periwinkle for a host of medicinal purposes.

In India, they treated wasp sting with the juice from the leaves. In Hawai'i they prescribed an extract of the boiled plant to arrest bleeding. In Central America and parts of South America, they made a gargle to ease soar throats and chest ailments and laryngitis. In Cuba, Puerto Rico, Jamaica and other islands, an extract of the flower was commonly administered as an eyewash for the eyes of infants. In Africa, leaves are used for menorrhagia and rheumatism. Surinamese boil ten leaves and ten flowers together for diabetes. Bahamians take flower decoction for asthma and flatulence, and the entire plant for tuberculosis. In Mauritius, the leaves infusion s given for dyspepsia and indigestion. In Vietnam, it is taken for diabetes and malaria. Curacao and Bermuda natives take the plant for high blood pressure. [11]

Phylogenetic Trees

The phylogenetic tree below gathers together all of the information that you just read about. Beginning with the Domain Eukarya, and traveling all the way down to the species *Catharanthus roseus*, there are a a lot of stepping stones along the way, each classification containing their very own set of characteristics unique to that taxonomy. [13]

Taxonomy**Domain:** Eukarya**Kingdom:** Plantae**Phylum:** Magnoliophyta**Class:** Magnoliopsida**Order:** Gentianales**Family:** Apocynaceae**Genus:** *Catharanthus***Species:** *Catharanthus roseus***Figure 2: Phylogenetic Trees of *Catharanthus roseus*****Figure 1: Flowering tops of *Catharanthus roseus* [14]**

PHARMACOLOGICAL ACTIVITIES

Antimicrobial activity

Balaabirami et al., (2012) was conducted an original research on In Vitro Antimicrobial & Antifungal activity of *Catharanthus roseus* leaves extracts against important pathogenic organism. Antimicrobial activity of *Catharanthus roseus* extract against pathogenic organism tested, ethanolic fractions gave better results when compared to other organism tested to other fractions tested. This study has revealed the presence of secondary metabolites like alkaloids in the leaves of *Catharanthus roseus*. It has further confirmed that the leaf extract could be used for the treatment of infections caused by the fungi *Aspergillus* spp. and other fungal diseases. The result shows that to the folkloric use of this plant in treating microbial infections *Catharanthus roseus* could be exploited for new potential antibiotics. [1]

Ghosh et al., (2010) postulates after a research on Antimicrobial activity on *Catharanthus roseus*, the different extracts (ethanol, acetone, methanol) show positive response on distinct organism. The organism used in that study was, *Staphylococcus aureus* NCIM 5021, *Pseudomonas aeruginosa* NCIM 2036, *Bacillus subtilis* NCIM 2010 and *Salmonella typhimurium* NCIM 2501. [2]

Anthelmintic activity

Hoskeri et al. (2011) was done a research work on Evaluation of In-vitro Anthelmintic Activity of *Catharanthus roseus* Extract. In the study solvents namely ethanol and water were used sequentially for crude extraction of *Catharanthus roseus* whole plant. To justify the ethnomedical claims of *Catharanthus roseus* we made an efficient attempt in evaluating the anthelmintic property of *Catharanthus roseus*. Different concentration of ethanol extract of *Catharanthus roseus* was used against *Pheretima posthuma*. Among the various concentrations tested, ethanol extract at 200 mg/ml showed efficient paralysis effect (6.67 min) than other treated groups, whereas ethanol extract 250 mg/ml showed significant

anthelmintic activity with death time of 46.33 min. [12]

Anti-diabetic activity

Mostofa et al., (2007) was conducted a study on Antidiabetic effects of *Catharanthus roseus*. The effects of different doses of aqueous extracts of nayantara (*Catharanthus roseus*) leaves were introduced in the experimentally diabetic induced rats. The finding was the reduction of blood glucose level in rat after 14 days of Nayantara extract administration. [3]

Vega-A vila et al., (2012) was run a research work on Hypoglycemic Activity of Aqueous Extracts from *Catharanthus roseus*. After total research it was find that the aqueous extract (250 mg/Kg) of flowers, leaves, roots, and stems from *Catharanthus roseus* produced hypoglycemic effect in healthy and alloxan diabetic mice ($P < 0.05$). The aqueous leaf extract had the best hypoglycemic effect on healthy mice; meanwhile the best hypoglycemic effects on diabetic mice were presented by the aqueous stem extract. The alkaloid-free aqueous stem fraction had hypoglycemic effects like tolbutamide (control drug) on alloxan-induced diabetic mice. [4]

Hassan et al., (2011) postulates that ethanolic leaf extract of *Catharanthus roseus* has antidiarrheal activity in Wistar rats. We therefore recommend further investigation of the fractions of the ethanolic extract responsible for the observed antidiarrheal effect of *Catharanthus roseus*. [5]

Antioxidant activity

Asheesh kumar et al., (2012) were investigate the antioxidant activity of *Catharanthus roseus*. On the study it was found that the habitat temperature has an particular effect on the antioxidant activity of *Catharanthus roseus*. Methanolic leaf extract were used to conduct the study. [6]

Rasool et. Al., (2011) were done a research work . In that study they presented results of various in vitro antioxidant assays to investigate the effect of solvent on the extraction and total antiradical potential of different extracts of *Catharanthus roseus*. The

various antioxidant assays of plant extract and its fractions revealed *C. roseus* to be a good source of natural antioxidants. 100% methanolic extract and 100% ethylacetate fraction of *C. roseus* shoots were found to exhibit highest antioxidant activity. On the basis of results of this study it is clear that *C. roseus* shoots extract can be used as a potential source of easily accessible natural antioxidants as well as in pharmaceutical applications. [7]

Wound Healing Activity

Nayak et al., postulates that an ethanol extract of *C. roseus* flower has properties that render it capable of promoting accelerated wound healing activity compared with placebo controls. Wound contraction, increased tensile strength, increased hydroxyproline content and the hypolipidemic active principles and to elucidate their mechanism of action. [9]

Cytotoxic activity

Siddiqui et al., was conduct a study to investigate the cytotoxic activity of *Catharanthus roseus*. The study was found that the Catharanthine at different dose (methanol extract) provide cytotoxic action against the HCT-116 colorectal carcinoma cell line. [10]

CONCLUSION

The extensive survey of literature revealed that *Catharanthus roseus*, is an important medicinal plant with diverse pharmacological spectrum. *Catharanthus roseus* is widely used

antimicrobial activity support further evaluation of *C. roseus* in the topical treatment and management of wounds. [8]

Hypolipidemic Activity

Yogesh Patel et al., (2011) was done a study to find out the Hypolipidemic activity of *Catharanthus roseus* (Linn.). They found 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. Further investigations are warranted to identify in Ayurveda, Siddha, Chinese, Malaysian medicine etc. The vast study done on the plant proved that the plant has many important phytoconstituents like Catharanthine, Gallo-tannic acid, bellericanin, ellargic acid, ethyl gallate, galloyl glucose and chebulaginic acid, phenyllembelin, fructose. These compounds were found to be responsible for many of the pharmacological activities such as antimicrobial, antioxidant, antidiarrhoeal, antidiabetic, analgesic, anthelmintic, wound healing, cytotoxic activities. Further the plant is used in the treatment of gastric ulcer, piles, spasm. Hence, this plant provides a significant role in the prevention and treatment of a disease.

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