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A REVIEW ON Catharanthus roseus

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ABSTRACT

Ayurveda is the Indian traditional system of medicine which focuses on the medical potential of plants. *Catharanthus roseus* is one plant recognized well in Ayurveda. The genus Catharanthus consists of eight species of which seven are native to Madagascar and one, *C. pusillus*, to India. *Catharanthus roseus*, Madagascar periwinkle is one of the few pharmacological plants that have a long history of therapeutic voyage from Mesopotamian folklore of 2600 BCE till today playing a considerable role as herbal and traditional medicine of various diseases. The *Catharanthus* (or Vinca) alkaloids comprise a group of about 130 terpenoid indole alkaloids. Vinblastine is now marketed for more than 40 years as an anticancer drug and became a true lead compound for drug development. Due to the pharmaceutical importance and the low content in the plant of vinblastine and the related alkaloid vincristine, *Catharanthus roseus* became one of the best-studied medicinal plants. Consequently it developed as a model system for biotechnological studies on plant secondary metabolism.

Keywords: Species, alkaloids, vincristine, vinblastine, *Catharanthus roseus*

1.INTRODUCTION

The preservation of traditional cultures, biodiversity, community health care, and drug development all benefit from ethnobotanical knowledge on medicinal plants and their use by indigenous societies. The Apocynaceae family's Catharanthus roseus L. (G.) Don is a significant source of medicinal plants. It is a dicotyledonous angiosperm that produces the terpene indole alkaloids vinblastine and vincristine, which are used to treat cancer [1]. After refinement and addition, the true knowledge of how to use medicinal plants was passed down from generation to generation [2]. The traditional dishes are made using either the entire plant or its many parts, such as the leaf, stem, bark, root, flower, and seed, as well as its byproducts, such as gum, resins, and latex [3].

Catharanthus roseus Linn, a perennial plant that is native to Madagascar and Southern Asia, is also known as Vinca rosea, Madagascar periwinkle, and member of the Apocynaceae family [4,5]. The plant has expanded throughout India's tropical and subtropical regions and thrives untamed on the country's plains and lower foothills in both the country's northern and southern highlands. Locally, it is known as Kemunting Cina in Malaysia. The National Cancer Council of Malaysia uses the periwinkle emblem as a representation of hope for cancer patients [6].In 1910, Peckolt wrote about the usage of an infusion of the leaves in Brazil to treat and prevent chronic wounds, treat toothaches, and control haemorrhage and scurvy. Related species have been employed in Europe to commercially reduce the flow of milk. It has been used to treat diabetic ulcers in the British West Indies, and it has also been mentioned as an efficient oral hypoglycemic medication in the Philippines. More recently, it has been found that the whole alkaloids exhibit both a considerable and long-lasting hypotensive action and a moderate antibacterial activity. Although the antibacterial and hypoglycemic properties of this plant's alkaloids have not been proven, ajmalicine, one of them, has been reported to temporarily lower arterial blood pressure. The name "Periwinkle" or "Catharanthus roseus" (Family- *Apocynaceae*), often referred to as "Nayantara" or "Sadabahar," comes from the Greek and means "pure flower." While roseus is Latin for "red rose" or rosy[7].

1.1Pharmacognostical plant profile

Botanical name- *Catharanthus roseus*

Common name- Sadabhar

Part typically used- Leaves

Colour- Green

Phytochemical Constiuents-Major being Alkaloids from 0.74 to 0.82%; important being vincristine, vinblastine, catharanthamine, vincoline. Other alkaloids viz, deoxyvinblastine, leurosine, pleurosin, leurocristine, leurosidine, vincolinine, vinacardine, roseadine, vindolicine, rosicine, etc are isolated

Botanical Description-Oval leaves (1-2in long) decussate, petiolate; lamina variable, elliptic, obovate or narrowly obviate; apex mucronate

1.2.Pharmacognostical study

1.2.1.Plant morphology:

Catharanthus roseus is an evergreen sub herb plant growing to 1 m tall. The leaves are oval to oblong, 2.5- 9.5 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 center, with a basal tube about 2.5-3 cm. long and a corolla about 2-5 cm. diameter with 5 petal like lobes. The fruit is a pair of follicles about 2-4 cm. long and 3 mm broad [8].

Fig- *Catharanthus roseus*

1.2.2Scientific classification:

Table 1 Scientific classification of *Catharanthus roseus*

1.	**Kingdom**	Plantae
2.	**Division**	Magnoliophyta (Flowering plants)
3.	**Class**	Magnoliopsida (Dicotyledons)
4.	**Order**	Gentianales
5.	**Family**	Apocynaceae
6.	**Genus**	Catharanthus
7.	**Species**	roseus

1.2.3.Vernacular name:

Table 2 Vernacular name of plant

1.	Sanskrit	Nityakalyani, rasna, sadampuspa, sadapushpi
2.	English	Cayenne jasmine, old maid, Madagascar periwinkle, Red periwinkle
3.	Hindi	Sada suhagan, sadabahar
4.	Kannada	Batla hoo, bili kaasi kanigalu, ganeshana hoo, kempu kaasi kanigalu
5.	Telugu	Billaganneru
6.	Malyalam	Banappuvu, nityakalyani, savanari, usamalari
7.	Tamil	Cutkattu malli, Sudukadumallakai

2.Macroscopic properties

Table 3 Organoleptic properties of *Catharanthus roseus*

S.No.	Properties	Catharanthus roseus leaves
1.	Apperance	Oval leaves, decussate, petiolate; lamina variable, elliptic, obovate or narrowly obviate; apex mucronate
2.	Color	light green above and whitish below
3.	Odor	Odourless
4.	taste	Slightly bitter

3.Microscopic properties:

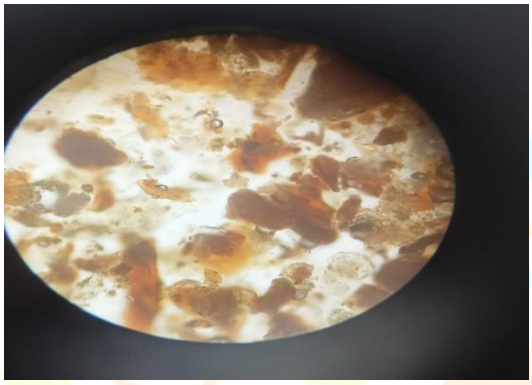

Fig:- T.S. of Vinca leaf

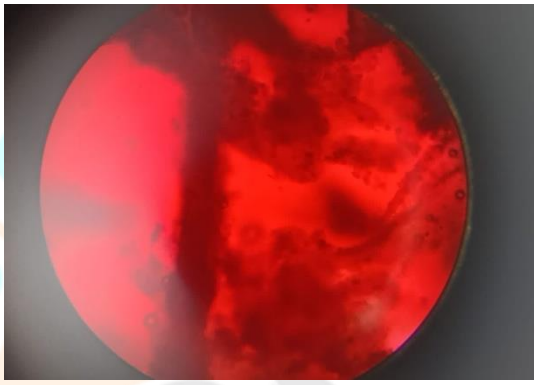

Fig:- Trichome

Vinca has dorsiventral leaf structure.Epidermis is a single layer of rectangular cells covered with thick cuticle.It consists of unicellular covering tricomes and cruciferous stomata.In the mesophyll region single layer of elongated and closely packed palisade parenchyma cells are present, just below the upper epidermis. In the midrib region two to three layers of collenchymas is present both below the upper epidermis and above the lower epidermis. Vascular bundle consisting of xylem and phloem is present in the middle of midrib region and rest of the intercellular space is covered by five to eight layers of spongy parenchyma. Calcium oxalate crystals are absent.

4.PHYSIO-CHEMICAL TEST:

Table 4 Physical and chemical test

S.No.	PARAMETERS	VALUE
1.	**Total ash**	**0.4% W/W**
2.	**Acid insoluble ash**	**0.7%W/W**
3.	**Water insoluble ash**	**1.7%W/W**
4.	**Sulphated ash**	**4.2%W/W**
5.	**Moisture content**	**11%W/W**
6.	**Loss on Drying**	**6.01%W/W**
7.	**Foaming index**	**0.8 cm height**
8.	**Swelling index**	**0.8gm**

5.LITREATURE REVIEW:

M Padmaa Paarakh* *et al.*(2019): The most dreaded six-letter disease that can harm people in the worst ways is cancer. Excellent progress has been achieved over the past few decades, yet the treatment of cancer is still a mystery. But nature always finds a way to keep things in balance, and we have the good fortune of plants providing incredibly promising anti-cancerous properties. Alkaloids from Catharanthus roseus, often known as the Madagascar periwinkle or pink periwinkle, a kind of flowering plant in the dogbane family-Apocynaceae, are the most effective higher plant substance used in cancer chemotherapy. It is natural and endemic to Madagascar, but it is frequently cultivated as an attractive and medicinal plant. It is the source of the well-known oncolytic alkaloids vincristine and vinblastine, which are used successfully to treat cancer

Latha M.S.* *et al.*(2017): From this plant, more than 400 different alkaloids have been extracted and given names.Alkaloids including Ajamalicine, serpentine, and reserpine, which are 366hytochemi for hypotensive, anti-diabetic, anti-microbial, antioxidant, and

antispasmodic activities, are what give it its healing effects.It became a prominent anticancer herb along with many other medicinal properties due to the presence of the cancer-fighting Vincaalkaloids vincristine, vinblastine, vinorelbine, and vindesine.The most crucial drug required in a fundamental healthcare system, vincristine is on the list of essential medicines maintained by the World Health Organization.The medical benefits of the phytochemicals found in Catharanthus Roseus are briefly discussed in this review.

Sharma V.* *et al.*(2016): More intriguingly, the usage of organic materials has been noted as a key alternative with fresh perspectives on cancer treatment. Studies on plants with anti-cancerous properties have been done, but they still need to be tested on people. Another factor is the development of new tools to identify the active biomolecule. At the moment, our attention is on the value of Canthranthus roseus for its anti-cancerous properties. What's more intriguing is that this plant's vincristine and vinblastine have been found as possible anti-cancerous substances.

Kabesh K.* *et al.*(2015): The leaves of the Catharanthus roseus plant are used to treat cancer. The current study's objective is to examine the 367hytochemical analyses and antimicrobial activity of Catharanthus roseus aqueous and methanol extracts. The antioxidant property was examined using the enzymatic and non enzymatic (DPPH) technique.

Alkaloids, phenol, saponins, and protein are all present, according to qualitative analysis of 367hytochemical screening. Thin Layer Chromatography (TLC), the industry-standard method for isolating organic molecules, was used to find additional 367hytochemical presences.

Patharanjan S.* *et al.* (2014): DPPH radical scavenging activity was measured for the antioxidant potency of the indigenous medicinal plant C. roseus leaf extracts and fractions using solvents of varied polarity (ethanol, methanol, acetone, hexane, butanol, and water). The antioxidant properties of the C. roseus leaves were present in the extracts and fractions of the plant in significant amounts and at varying concentrations. The antioxidant activity in the leaves of C. roseus was good (81.70%). Alkaloids, terpenoids, steroids, flavonoids, and other secondary metabolites of plants are found in the C. roseus according to a 367hytochemical investigation.

6.PHARMACOLOGICAL ACTIVITY:

6.1.Anti Cancer activity:

C.roseus produces Vinca alkaloids which are well known for their anti-cancer properties. Some of the alkaloids are vinblastine, vincristine, vinorelbineand vindesine. [9] Anti-cancer drugs derived from *C.Roseus* act us inhibitors of tubulin by binding to α/β- –tubulin. This prevents its association in to microtubules which provide cells with both the structure and flexibility they need to divide and replicate. [10,11] 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 [12] and especially greatest activity was found against the multidrug resistant tumor types[13].

Vinca alkaloids, also known as mitotic spindle poisons, prevent the formation of spindle structures from microtubules, which prevents mitosis in the cell cycle. Vinca alkaloids hence successfully prevent cancer cells from dividing. Different Vinca alkaloids have their own unique properties [14]. For many years scientists have involved in the process to synthesize new derivatives of vinblastine and vincristine. Modification in vindoline skeleton or catharanthine moiety produced a number of new selective, less toxic antitumor agents.[15] Vinblastine is used experimentally for thetreatment of neoplasms and is recommended for Hodgkin's disease andchoriocarcinoma. Vincristine another alkaloid is used for leukemia in children. In vitro tests using various concentrations of Catharanthus roseus methanolic crude extracts revealed strong anticancer activity against a wide range of cell types, with multidrug resistant tumour types showing the greatest anticancer activity. Vinblastine is sold as Velban and Vincristine as oncovin[16,17]. That is microtubules are the building block of protein and is vital to the proper functioning of the mitotic spindle in mitosis i.e., cell division. Vinca alkaloids known as mitotic spindle poisons as they inhibit further assembly of the spindle forms from microtubules, there by inhibiting mitosis in cell cycle. [18]

6.2.Anti-oxidant activity:

The results showed that the ethanolic extract of periwinkle types' roots had a sufficient scavenging effect throughout the entire assay in a concentration-dependent manner, however C. roseus was discovered to have higher antioxidant activity than C. alba [19]. Significant levels of volatile and phenolic substances, such as caffeoylquinic acids and flavonol glycosides, which are known to have antioxidant action, are found in Catharanthus roseus. It has an important role in the body's defense system that acts as antioxidants against reactive oxygen species (ROS), which are harmful by forming such products through normal cell aerobic respiration [20] Reactive oxygen species are the harmful byproducts created in our body in normal aerobic respiration and other metabolic activities. Antioxidants are found to be effective against these harmful free radicals.[21] Vindolicine, present in the plant showed the highest antioxidant potential in ORAC and DPPH assays and it also alleviated H2O2-induced oxidative damage in β-TC6 cells at 12.5 μg/mL and 25.0 μg/mL [22].

6.3.Anti-diabetic activity:

Blood sugar lowering is comparable to the common medication glibenclamide. The increased hepatic glucose utilisation has led to the appearance of the hypoglycemic impact. In comparison to the dichloromethane and methanol extracts, which reduced blood glucose levels in diabetic rats by 49–58% and 20%, respectively, respectively, the aqueous extract was found to lower blood glucose by roughly 20%.

The enhanced hepatic glucose utilisation has led to the appearance of the hypoglycemic impact. 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 propritery name Vinculin as a treatment for diabetes . Alcoholic whole plant extracts at high dose (500 mg/kg) exhibited significant antihyperglycemicactivity without acute toxicity. The extract effectively reverses the changes in the blood sugar level and the beta-cell population. The exact phytoconstituents responsible for the anti-diabetic effect are not known yet. [23]

6.4.Anti-microbial activity:

Alkaloids, flavonoids, steroids, phenolics, tannins, and saponins are some of the most significant antibacterial components found in C. roseus, according to phytochemical and antimicrobial research. The methnol, ethanol, acetone and chloroform extracts of these plants have shown antibacterial activity against common human pathogens Escherichia coli, Vibrio cholerae, Styphylococcusaureus and Streptococcus faecalis. The discovery of a potent remedy from plant origin will be a great advancement in bacterial infection therapies as most of the bacterial pathogens were developing resistance against many of the available anti-microbial drugs. [24] The antimicrobial activities of plant extracts may reside in a variety of different components, including aldehydes and phenolic. [25] It is demonstrated that mutant leaf extracts had good antibacterial potential against S. aureus, S. citreus, and E. coli and P. aeruginosa bacteria while B. subtilis was not influenced. The fluctuation in antibacterial activity between mutant and control plant leaves might be due to the genomic changes, aroused by the mutagen correspondingly influencing the fusion and level of bio-active compounds like vincristine, Vinblastine, vindoline in tissue, which might be obligation for antibacterial property of periwinkle leaves as also reported earlier [26].

6.5. Anti-Helminthic activity:

Infections with helminthes are a chronic condition that can affect both humans and livestock. It was discovered that Catharanthus roseus has been utilised as an anti-helminthic since traditional times. The anti-helminthic ability of C. roseus has been assessed using Piperazine citrate as the standard reference and Pheretima posthuma as an experimental model. It was discovered that the 250 mg/ml ethanolic extract has substantial anti-helminthic efficacy.

6.6.Hypotensive activity:

The plant's leaf extract had a substantial impact in lowering blood pressure. There are 150 valuable alkaloids known to exist in the leaves, in addition to other pharmacologically potent substances. The leaf extracts (hydroalcoholic or dichloromethane-methanol) have been shown to have significant hypotensive and antihyperglycemic effects in laboratory animals [27].

6.7.Anti-diarrheal activity:

Castor oil was used as an experimental diarrhea-inducing agent while Wistar rats were evaluated for the plant's ethanolic leaf extract's anti-diarrheal properties.The diarrhoea caused by castor oil was inhibited by Catharanthus roseus in a dose-dependent manner[28].

6.8.Wound healing activity:

When rats with open wounds were given an ethanolic extract of the C. roseuss how, the wounds healed quickly. The hydroxyproline concentration and higher tensile strength of the granulation tissues are to blame for this. It aids the management of wound healing with C. roseus. [29]

7.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. Catharanthus roseus is one of the important medicinal herb with numerous biological properties. Different pharmacological studies and the traditional used proved the high medicinal properties of the Catharanthus; which continuously being used in the treatments of number diseases. Various important alkaloid, mostly the monomers were successfully identified in culture media with the enhanced yields; however the commercial production is still far away. The Catharanthus roseus have shown a more potent anti-diabetic activity, anticancer activity, antioxidant activity and cytotoxic activity. Ethanol extracts of leaves and flowers show highest diabetic wound healing activity. The phytochemical and antimicrobial studies made on Catharanthus roseus have shown that it has very important antimicrobial components alkaloids, flavonoids, steroids, phenolics, tannins and saponins.

REFRENCES:-

1. Ajaib M, Khan ZUD, Khan N, Wahab M. Ethno botanical studies on useful shrubs of District Kotli,Azad Jammu & Kashmir, Pakistan. Pak J Bot. 2010; 42 :1407 -1415.

2. F. Haq, H. Ahmed, M. Alam. Traditional uses of medicinal plants of Nandiar Khuwarr catchment (District Battagram), Pakistan. J Med Plants Res.2011;5: 39–48.
3. K.Y. Khan, M.A. Khan, R. Niamat, M. Munir, H. Fazal, P. Mazari, et al. Elemen tcontent analysis of plants of genus Ficus using atomic absorption spectrometer. Afr J Pharm Pharmacol,2011;5: 317–321.
4. Sharma Sk. "Medicinal Plants used in Ayurveda". New Delhi: Rashtriya Ayurveda Vidyapeeth, Ministry of Health and Family Welfare, Govt of India 1998: 193.
5. The Wealth of India-Raw Materials New Delhi: Publication and Information Directorate, Council of Scientific and Industrial Research 1985;3: 391-395.
6. http://www.makna.org.my/periwinkle.asp
7. Balaji DH. Versatile. Therapeutic effects of Vinca rosea Linn. International journal of pharmaceutical Science and Health Care. 2014;1(4):59-76.
8. Sain M., Sharma V. Catharanthus roseus- A Review of Potential Therapeutics Properties. Int. J. Pure App. Biosci. 2013;1(6): 139-142
9. Noble R L., The discovery of the vinca alkaloids Chemotherapeutic agent against cancer, Biochemistry and Cell Biology. 1990; 689: 1344-1351.
10. Jordan, M. "Mechanism of Action of Antitumor Drugs that Interact with Microtubules and Tubulin". Current Medicinal Chemistry-Anti-Cancer Agents.2012; 2(1): 1–17.
11. Bhalla, Kapil N. "Microtubule-targeted anticancer agents and apoptosis". Oncogene. 2013;22(56): 9075–86.
12. Ueda JY, TezukaY, Banskota AH. Antiproliferative activity of Vietnamese medicinal plants. Biological Pharmaceutical Bulletin. 2002; 25(6):753- 60.
13. Wang S, Zheng Z, Weng Y. Angiogenesis and antiangiogenesis activity of Chinese medicinal herbal extracts. Life Science. 2004; 74(20):2467-78.
14. Asma N. "An updated Review on Catharanthus Roseus: Phytochemical and Pharmacological Analysis". Indian Research Journal of Pharmacy and Science 2016; 3(2):631-653
15. Keglevich P, Hazai L, Kalaus G, Szántay C. Modifications on the basic skeletons of vinblastine and vincristine. Molecules. 2012 ;17(5):5893-914.
16. Banskota AH. Antiproliferative activity of Vietnamese medicinal plants. Biological Pharmaceutical Bulletin, 2002; 25(6):753-60.
17. Jordan, A, Hadfield, John A. ,Lawrence, Nicholas J.; McGown,Alan T. "Tubulin as a target for anticancer drugs: Agents which interact with the mitotic spindle". Medicinal Research Reviews.1998;18(4): 259–96.
18. Alba Bhutkar MA, Bhise SB. Comparative Studies on Antioxidant Properties of Catharanthus Rosea and Catharanthus. International Journal of Pharmaceutical Techniques . 2011 ; 3(3):1551 -1556.
19. Salah, N. "Polyphenolic flavanols as scavengers of aqueous phase radicals and as chain-breaking antioxidants." Archives of biochemistry and biophysics 1999: 339-346.
20. Salah N, Miller N J Paganga G Tijburg L Bolwell G P and Rice Evans C. Poly phenoic l flavanols as scavangers of aqueous phase radicals and as chainbreaking antioxidants arch Bio Chem Biophy, 1995; 322: 339-46
21. Tiong SH, Looi CY, Hazni H, Arya A, Paydar M, Wong . Antidiabetic and Antioxidant Properties of Alkaloids from Catharanthus roseus (L.) G. Don. Molecules. 2013

22. Mohammed Fazil Ahmed, Syed Mohammed Kazim, Syed Safiullah Ghori, Syeda Sughra Mehjabeen,Shaik Rasheed Ahmed, Shaik Mehboob Ali and Mohammed Ibrahim, Research Article" Antidiabetic Activity of Vincarosea Extracts in Alloxan-Induced Diabetic Rats" Hindawi Publishing Corporation International Journal of Endocrinology, 2010
23. Retna, A.M. and Ethalsha, P. A review of the taxonomy, ethnobotany, chemistry and pharmacology of Catharanthusroseus (Apocyanaceae). 2013; 2(10): 3899-3912.
24. Lai. P.K. and Roy, J. Antimicrobial and Chemopreventive properties of herbs and spices. Curr. Med. Chem., 2004; 11: 451-14602.
25. Verma AK and Singh RR. "Induced dwarf mutant in Catharanthus roseus with enhanced antibacterial activity". Indian Journal of Pharmaceutical Sciences 2010;72(5) :655.
26. Pillay PP, Nair CP, Santi Kumari TN. Lochnera rosea as a potential source of hypotensive and other remedies. Bulletin of Research Institute of the University of Kerala. 1959;1:51-4.
27. Rajput MS, Nair V, Chauhan A, Jawanjal H, Dange V. Evaluation of antidiarrheal activity of aerial parts of Vinca major in experimental animals. Middle-East Journal of Scientific Research. 2011;7(5):784-8.
28. Nayak BS, Anderson M and Pereira LMP. Evaluation of wound-healing potential of Catharanthus roseus leaf extract in rats. Fitoterapia, 2007; 78: 540-544.
29. Swanston-Flatt SK, Day C, Flatt PR, et al. Glycaemia effects of traditional European plant treatments for diabetes studies in normal and streptozotocin diabetic mice. Diabetes Res. 1989; 10: 69-73.