

## MEDICINAL VALUES OF VINCA

<sup>1</sup>\*G. Edward Raju, <sup>2</sup>BH. Sriswetha, <sup>3</sup>M. Shiny, <sup>4</sup>K. Nageswara Rao and <sup>5</sup>D. Raghava

K.G.R.L. College of Pharmacy, Bhimavaram.

Corresponding Author: G. Edward Raju

K.G.R.L. College of Pharmacy, Bhimavaram.

Article Received on 26/07/2022

Article Revised on 16/08/2022

Article Accepted on 06/09/2022

### ABSTRACT

In the earth there are nearly about 3,50,000 species of plants are found & each plant have a great medicinal value. The plant vinca is also known as catharanthus, sodafuli, periwinkle and barmasi and which is belong from the family of apocynaceae. It produce late springly to summer and grown in any where in the garden. The vinca plant is a very useful across the world wide and it can be cultivated in dry and nutritional condition. The chemical constituent of vinca bind to the tubulin and prevent the formation of micro tubules and block the mitosis in metaphase. The vinca have lots of medicinal value such as anti cancer drug, antidiabetic, antimicrobial and antidysentric. Anti cancer drug vinca can be given as targeted therapy and combination therapy and it is a class of cytotoxic drug and have ability to inhibit the cancer cells.

**KEYWORDS:** Rosea, Apocynaceae, Sodafuli, Vinblastine, Vincristine.

### INTRODUCTION

Vinca rosea is an important medicinal plant which is belonging to the family of apocynaceae. It is a dicotyledonous angiosperm and has two terpenes alkaloids. That is vinblastine and vincristine which is use to treat cancer. Vinca grows throughout the india up to 500 meter. It is grown freely in tropical and subtropical area in south india and north eastern states of india. Its flower look white to dark pink with a darker red centre and a basal tube of 0.2- 3.0 cm long with a corolla of about 2.0 -5.0 cm diameter with five petals like lobes. These fruits follicles are found in pair about 2.0-4.0 cm long and 3mm broad (manpreet kaur, 2002). The various synonyms of vinca are sadabahar, ratanjot, sadfuli, catharanthus roseus.

### HISTORY

Vinca (OR) Vince rosea has been known since BC50 European countries as anti dysenteric, anti haemorrhagic, diuretic and wound healing. This plant was used in the form of tea for the treatment of diabetes in jaimaica and brazil for toothache. This plant was first scientifically investigated by Canadian workers noble, beer and cutts. During the studies, it was found that it does not have any oral hypoglycemic principle, but contains alkaloids possessing anti leukemic principle and the alkaloid was named as vinca leuco blastine because of such activity, the plant was throughly investigated at m/s eli lilly by svoboda and his collegeous and they reported four dimeric indole alkaloids, vi2. vinca -leuco blastin,

leurosine, leurosidine and leurocristine. All this compounds exhibits anti cancer activities. Some changes were later reported for the names of these compounds such as vinca leucocristine to vinblastine and leurosine leurosidine and leurocristine to vinleurosine, vinrosidine and vincristine respectively.

### BOTANICAL CLASSIFICATION

Botanical names (s) : Vinca rosea (Catharanthus roseus)  
Family name : Apocynaceae  
Kingdom : Plantae  
Division : Magnoliopsida (flowering plants)  
Class : Magnoliopsida (Dicotyledons)  
Order : Gentianales  
Family : Apocynaceae  
Genus : Catharanthus  
Species : C. Roseus

### VANACULAR NAMES

English : Cayenne, Jasmine, Old maid, Periwinkle  
Hindi : Sada -Bahar  
Malayalam : Banappuva, Nitya kalyani, Savanari.  
Marathi : Sadaphool, Sadaphul, Sadaphuli  
Sanskrit : Nityakalyani, Rasna, Sadampuspa, Sadapushpi  
Tamil : Cutkattu malli, Cutukattu malli, Cutukattuppu  
Telugu : Billaganneru  
Gujarati :Barmasi  
Bengali : Noyontara  
Biological source: It is dried whole plant of vinca rosea

### GEOGRAPHICAL SOURCE

It is probably indigenous to Madagascar. It is cultivated in South Africa, India, USA, Europe, Australia and Caribbean islands as an ornamental plant, as well as, for its medicinal properties.

**Habit:** A perennial herb

**Stem:** Erect, cylindrical, branched, solid, reddish green, glabrous

**Leaf:** Cauline, simple, opposite, decussate, petiolate, exstipulate, obovate, entire glabrous, mucronate apex, uniconate, reticulate venation.

**Inflorescence:** Cymose, flower arranged in axillary pairs.

**Flower:** Pedicellate, draculate, hermaphrodite, actinomorphic, complete, pink, hypogynous.

**Calyx:** 5 polysepalous, glandular, green, inferior, quincuncial aestivation.

**Androecium:** 5, free epipetalous, alternate to petals, all most sessile, anthers, dorsifixed, connivent round the stigma, yellowish.

**Gynoecium:** 2 carpels (bicarpellary), syncarpous, carpels united above in the region of style and stigma ovaries free (apocarpous below) with single style or

stigma, ovaries, superior, nectar secreting, disc present beneath ovaries, unilocular, marginal placentation, gland present alternative.

### MORPHOLOGICAL CHARACTERS

A Vinca is found in blue, purple and white colour. It is a type of annual or perennial plant. Vinca is near about 0.52 to 1 cm in length and its leaves are oblong, ovate, glossy and bitter in taste with slight odour (Erdogru, 2002).

### ORGANOLEPTIC CHARACTERS

The leaves are green, roots are grey, flowers are violet, pink – white or carmine red in colour. The odour is characteristic and taste is bitter. Vinca is an erect, pubescent herb, with branched top root. Leaves are simple, petiolate, ovate, or oblong, uniconate, reticulate, entire, brittle, with acute apex and glossy appearance. Flowers are bractate, pedicellate, complete, hermaphrodite, normally 2 to 3 in cymose axillary clusters. Fruits are follicles with several black seeds.

### MICROSCOPIC CHARACTERS

Upper surface shows presence of single layer of rectangular celled epidermis with unicellular covering trichomes. Palisade is made up of single layer beneath upper epidermis and contains compact elongated cells. Spongy parenchyma is 5 to 8 layered with intercellular spaces. Midrib shows presence of collenchymas below the upper epidermis and above the lower epidermis. Xylem and phloem are present in the centre.

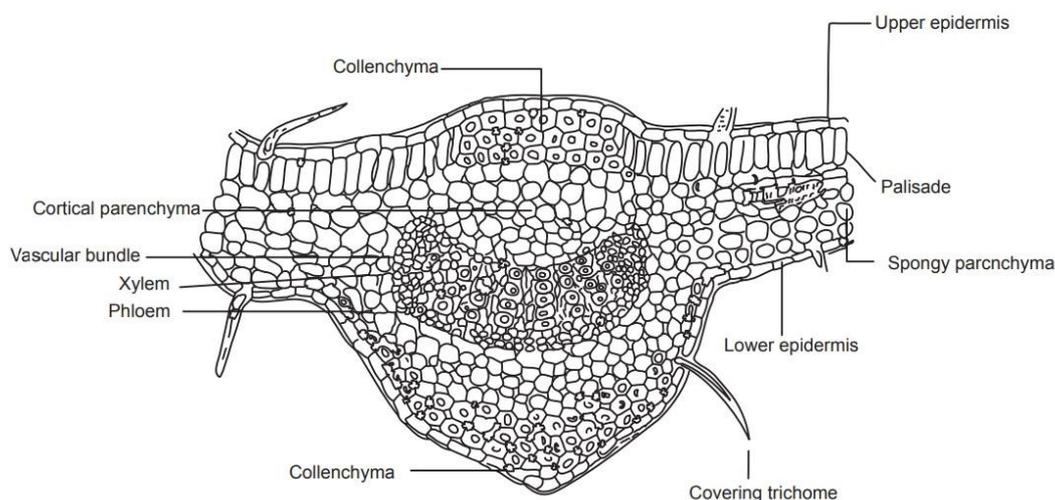


Figure 1.

### CULTIVATION AND COLLECTION

Vinca grows all over India up to 500 meters. It is grown well in tropical and subtropical areas in South India and northwestern states of India except the highly alkaline or waterlogged soil. It favourably grows in light sandy soil, rich in humus. The rain fall of about 100 cm is most suitable for it. For propagation, the fresh seeds are used and sown in nurseries or sometimes direct sowing

is also done. For direct sowing about 2.5 kg of seeds per hectare are required. They are mixed with 10 times quantity of sand and sown in rows of 45 cm apart. When the plants are sufficiently grown up, they are thinned out and a distance of about 30 cm is left between 2 plants. Nursery sowing is found to be economical. In Feb or March, they are sown in nursery and transplanted in open fields. After two months when they have achieved 6

to 7 cm height. They are transplanted in open fields at 45cm \*30cm. Distance and about 74,000 plants per hectare are necessary. The plants donot need much water supply are drought resistant. Through the plant does not require any special supply of fertilizers. A mixture of nitrogen phosphorous and potassium gives favourable results. Farm yard manner is also sometimes used reading is done periodically and the leaf stripping are cut about 7 to 8cm above the ground level after 1 year of growth and leafs, stems and seeds are dug out by ploughing, which are further washed, dried in shades and packed in bails. The seeds are collected from matured fruits for next propogation. The yield of dry roots, stems and leafs per hectare in irrigated land is 1 to5 land 3 tones respectively.

### CHEMICAL CONSTITUENTS

About 150 alkaloids have been reported from vinca. Alkaloids such as ajmalicine, lochnerine, vindoline,

### CHEMICAL STRUCTURE

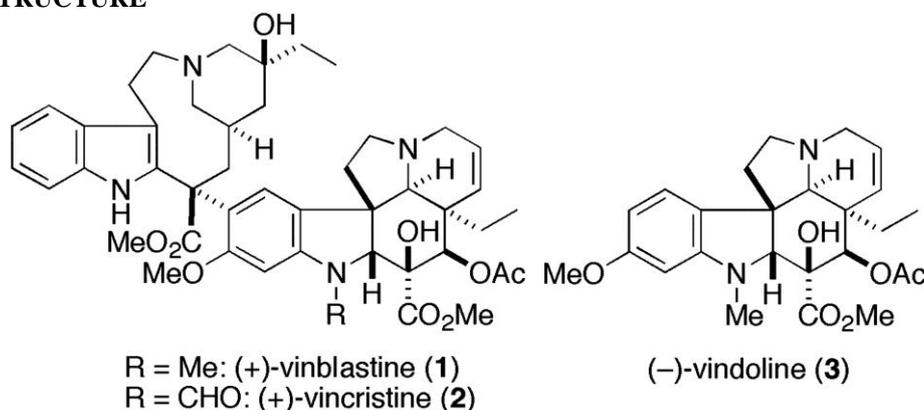


Figure. 2.

### MECHANISM OF ACTION

Vinca cause cytotoxicity is due to their interactions with disruption of microtubule function and tubulin, especially of microtubules comprising the mitotic spindle fiber and causing metaphase arrest. They can perform some other biochemical response which can be effective or may not be effective on microtubules. Have some effect which donot interrupted the microtubule only after treatment of cells with clinically irrelevant doses of the vinca. Vinca and other anti micro tubule drug are also shows effect on both malignant cells and non-malignant cells, in the non mitotic cell cycle, because microtubules are involved in various non-mitotic functions.

Vinca are connected to binding sites of tubulin which is separate from the taxanes, colchicines, podophyllotoxin and guanosin-5'-triphosphate.binding occur rapidly and can reverse too.Maintains the existence of vinca binding site /mole of tubulin dimer.<sup>[16-17]</sup> high affinity binding sites in each microtubule which is located at the end of per microtubule. the vinca bind at the binding site and interrupts microtubule congregation,but low drug concentration can be decreasing the rates of both growth and shortening at the assembly end of the microtubule

catharanthine, reserpine, serpentine, tetrahydro alstonine have been reported which are present in other genera of the family.

About 20 dimetric alkaloids which contain dose with anti neoplastic activity, including leurocraistine(vincristine US adopted name),vincalucoblastine(vinblastine US adopted name),vindescine are reported from the plants vinblastine is produced by coupling of the indole alkaloids catharthine and vindoline, both occur the plant. Vincristine is structurally similar to vinblastine, but as a formyl group rather than a methyl on the indole nitrogen in the vindoline derived version. Vinblastine can be converted into vincristine chemically. By using microbe streptomycin albogriseolus induced n-demethylation process nearly 500 kg of vinca are utilized to produce 1gram of vincristine, because the alkaloid is present in relatively small amount usually 0.85% alkaloids present in roots, 0.67% in leaves and 0.31% in stems.

that can cause produces a “kinetic cap and suppress function”. The disturbing effects of the vinca on microtubules dynamics, particularly at the ends of mitotic spindle, which causes meta phase arrest, occur at drug concentration below those that decrease microtubule mass. The vinca and other microtubule distort agents have power to inhibit malignant angiogenesis in vitro.

### PHARMACOLOGICAL VALUES

- **ANTI CANCER PROPERTY:** The anticancer active ingredients vinblastine and vincristine are derived from the leaf and stem of vinca. They inhibit the growth of human tumors. Vinblastine is used experimental or treatment of neoplasmas and for hodakins disease, chorio carcinoma. Vincristine and anothers active ingredients are used for leukemia in children (banskota, 2002; wang, 2004).
- **MEMORY ENHANCEMENT PROPERTY:** vinpocetine produces various actions that would hypothetically be beneficial in alzheimer's (AD). When study investigating this agent in a well defined cohort of AD patient found no benefit. Vinpocetine has been well tolerated at doses up to

60mg / d in clinical trails of dimension and stroke and no significant adverse events.

- **WOUND HEALING PROPERTY:** Vinca is useful for management of wound healing when wound contraction together with increased tensile strength and hydroxyproline (nayak, 2007).
- **HYPOLIPIDIEMIC PROPERTY:** Important anti-atherosclerotic activity as suggested by reduction in the serum level of total cholesterol, triglycerides, LDLc, VLDLc and histology of aorta, liver and kidney with action of leaf juice of vinca (jai narayan mishra ?).
- **HYPOTENSION PROPERTY:** The vinca leaves extract play significant role in hypotension. The leaves have been content 150 useful alkaloids among other pharmacologically active compound.
- **ANTI DIABETIC PROPERTY:** The ethanolic extract of vinca leaves show a dose dependent lowering of blood sugar in comparable to the standard drug and lower the blood sugar in comparable to the standard drug glibendamide.
- **ANTI MICROBIAL PROPERTY:** The extract from different parts of vinca is tested for anti-microbial property and the vinca leaf extract showed significantly higher efficacy. The anti bacterial property of the leaf extract of the vinca was checked against micro-organism and found that the extracts could be used as the prophylactic agent in the treatment of many of the disease (Prajankata patil, 2010).
- **ANTI OXIDANT PROPERTY:** The anti oxidant potential of the ethanolic extract of the roots of the varieties of vinca namely rosea (pink flower) and alba(white flower).
- **ANTI HELMINTHIC PROPERTY:** Helminthes infection are the chronic illness which affects the human beings and cattle. In vinca found to be used from the traditional period as an anti-helmenthic agent. The ethanolic extract of the vinca concentration of 250mg/ml was found to show the significant anti –helmenthic property.
- **ANTI ULCER PROPERTY:** Vincamine and vindoline alkaloids of the plant showed anti-ulcer property. The vincamine are present in the leaves of vinca plant shows cerebrovaso dilatary and neuroprotective property.
- **ANTI DIARRHEAL PROPERTY:** The ethanolic leave extract of vinca is show the anti-diarrheal property as tested in the wistar rats with castor oil which are the experimental diarrhea inducing agent by addition of pretreatment of the extract. These effect of ethanol extracts C.roseus are showed for the dose dependant inhibition on the castor oil decrease diarrheal (Mithun SINGH Rajput, 2011).

#### USES

Vinca is used to extract vincristine, vinblastine and ajmalicine, vincristine sulphate is an antineoplastic agent which may act by arresting mitosis at the metaphase it is

given intravenously in the treatment of acute leukemia of children. Some childhood leukemia's are also responded.

In adults hodgkins diseases, reticulum cell sarcoma lympho sarcoma, mycosarcoma, have shown short remission.

Vinblastine sulphate is an anti neoplastic agent, which may act by elastic mitosis at, meta phase or by interfering with aminoacid metabolism it suppresses immune response and is mainly used in the treatment of hodgkins disease and other lymphomas and choriocarcinoma.

Vinca also exhibits hypotensive and anti diabetic actions.

#### DOSE

**VINCRISTINE SULPHATE:-** 10-30ug/Kg of body weight intravenously, but maximum upto 2mg.

**VINBLASTINE SULPHATE:-**100ug/kg of body weight intravenously

#### EXTRACTION

As the plant contains very less percentage of alkaloids, it is not used as a galenical but for extraction of alkaloids. The extraction and separation procedure for alkaloids is based on the separation into soluble and insoluble tartarates in other solvent due to this vinblastine, vincristine and other weak bases are separated and then fractionated with the help of column chromatography using alumina as absorbent.

By using tissue culture technique, some of them vinca dimeric indole alkaloids like catharanthine and ajmicacine have been isolated.

#### CONCLUSION

In this review literature we are discussed about the vinca it is broadly used in medical field. These are consist of following chemical constituents and each and every constituents play a vital role like vinblastine, and vincristine have anti cancer property. Vinca is popular for anti cancer property but as well as it have memory enhancement, anti helmentic, anti oxident properties.

#### REFERENCES

1. Banskota A.H. Antiproliferative activity of vietnamese medical plants. *Biological Pharmaceutical Bulletin.*, 2002; 25(6): 753-60.
2. Hardwin, Christophe; Doris, Eric; Rousseau, Bernard; Mioskowski, Charles. "Concis synthesis of anhydrovinblastin from leurosine". *Organic letters*, 2002; 4(7): 1151-1153. Doi:10.1021/ol025560c.
3. Hirata, K., Miyamoto, K., Miura, Y. 1994. "Catharanthus roseus L. (Periwinkle); Production of vindoline and catharanthine in Multiple shoot cultures", In Bajaj, Y.P.S (ed). *Biotechnology in Agriculture and forestry* 26. Medicinal and Aromatic

- plants. VI. Springer – verlag, 46-55. ISBN 978-3-540-56391-4.
4. <http://en.wikipedia.org/wiki/vinpocetine>  
<https://en.m.wikipedia.org/wiki/vinpocetine> Huxley, A.ed. 1992. New RHS Dictionary of Gardening. Macmillan ISBN 0-333-47494-5.
  5. Jai Narayan Mishra, Navneet Kumar Verma, “A brief study an cathranthus roseus. A review.
  6. Jaleel CA., Panneerselvam R. Variations in the antioxidative and indole alkaloid statusin different parts of two varieties of Catharanthus roseus; An important folk herb. *Chininese Journal of pharmacology and toxicology*, 2007; 1(6): 487-494.
  7. Jordan MA., Thorower D., Wilson L. Effect of vinblastine podophyllotoxin & nocodazole on mitotic spindles. Implication for the role of microtubule dynamic in mitosis. *J cell sci.*, 1992; 102: 401-16.
  8. Keglevich, Peter, Hazai, Laszlo, Kalous, Gyorgy, Szantay, Csaba. “Modification on the basic skeletons of vinblastin and vincristine”. *Molecules*, 2012; 17(5): 5893-5914.
  9. Kokate C.K., Purohit A.P, Gokhale S.B. 2017. Pharmacognosy 53<sup>rd</sup> edition.
  10. Manpreet kaur, Vinca sources, Macroscopical character and uses, Article. Erdogrul Antibacterial activities of some plant extract used in folk medicine. *Pharm. Biol.*, 2002; 40: 269-273.
  11. Nayak BS., Anderson M., Pereira LMP. Evaluation of wound-healing potential of cathranthus roseus leaf extract in rats. *Fitoterapia*, 2007; 78: 540-544.
  12. Ngo, Quoc Anh, Roussi, Fanny, Cormier, Anthony; Thoret, Sylviane; Knossow, Marsel, Cruenard, Daniel; Gueritte, Françoise. “Synthesis and Biological evaluation of vinca alkaloids and and phomopsin hybrids”. *Journal of Medicinal Chemistry*, 2009; 52(1): 134-142. doi:10.1021/jm801064y. PMID 19072542.
  13. Prajankata Patil J., Jai S. Ghosh Anmtimicrobial Activity of cathranthus roseus - A detailed study. *British Journal of Pharmacology & Toxicology*, 2010; 1(1): 40-44.
  14. Sekar P. Vedic dues to memory enhancer. The Hindu. St-Pierre and De Luca 1995. Ab Cythochorome, 450. Monooxygenase Catalyzes the first step in the conversion of tabersonnine to vindolina in catharanthus roseus. *Plant Physiology*, 1996; 109(1): 131-139.
  15. Vincristine Sulphate. 2015. The american society of health- system Pharmacists Archived from the original on 2015- 01-02. Retrieved Jan 2.
  16. Wang S., Zheng Z., Weng Y. Angiogenesis and antiangiogenesis activity of chinese medical herbal extract. *Life science.*, 2004; 74(20): 2467-78.