

# Overview on a Vinca Alkaloid & Its Medicinal, Therapeutic Properties

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## ABSTRACT

The “medicinal plant” involve various types of plants used in herbal medicine. This plant used for medicinal purpose. It is tropical plant. The plant vinca is called as catharanthus, Sadafuli, periwinkle. The indole alkaloid is present in vinca and drug such as Vincristine, Vinblastin. which is belongs to the family of apocynaceae. Vinca or Catharanthus roseus is used for the treatment of diabetes, fever, malaria, throat infections, and chest complaints. It is also used in regulation of menstrual cycle.

**KEYWORDS:** Alkaloids, Properties, Function, Chemical constituents, Morphological Features, Medicinal Properties, Therapeutic properties

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## INTRODUCTION

### Alkaloids

Alkaloids means alkali, about 1000 alkaloids are found in the plant kingdom. Alkaloids are present in various parts of like such as leaves, bark, root, seeds, fungi. Alkaloids are concentrated in various dicot families like rutaceae, apocynaceae, papavaraceae, solanaceae.

### Properties of alkaloids

1. Its possess carbon, nitrogen and hydrogen. They exist as a salt.
2. Alkaloids are mostly colourless.
3. Free alkaloids are insoluble in water but soluble in organic solvents like ether or chloroform.
4. Alkaloids are mostly laevorotatory in character except conine and papavarine.

### Function of alkaloids

1. It act as regulatory growth factor.
2. They are reserve substance for nitrogen.
3. Some alkaloids are coloured so its help in attraction of insects in pollination.
4. It acts as repellents.

### Chemistry of alkaloid

#### Qualitative Test of alkaloids:

##### A. Precipitation test

Alkaloids are double salts with salts of heavy metals like gold (Au), mercury (Hg). So double salts are found to be

microcrystalline structure. It was observed under specific and controlled experimental parameters. In this method alkaloid solution is react with alkaloidal precipitating agent, for example  $H_2PtCl_6$  i.e. Chloroplatinic acid, on a microscopic glass slide, and gives rise to microcrystalline product having specific shapes and structure, their structure is based upon the manner of aggregation.

#### Example. Mayer's Reagent

##### Composition

Mercuric chloride 1.36g

Potassium iodide 3.00g

Distilled water to make 100.0 ml, Mayer's reagent gives cream colour precipitate with alkaloids.

#### 2 Hager's Reagent

A saturated solution of picric acid. It gives yellow colour precipitate with alkaloids.

#### Quantitative Analysis of Alkaloid

The method is based on the reaction of alkaloid with BCG i.e. bromocresol green and it gives yellow colour.

#### Reagent preparation

Bromocresol green solution was prepared through heating 69.8mg BCG with the help of 2 N NaOH. Then add distilled

water until it completely dissolved, and the finally solution was diluted to 1000ml with distilled water. Then phosphate buffer pH 4.7 was prepared by adjusting the pH of 2M sodium phosphate to 4.7 with 0.2 M citric acid.

### Separation of Alkaloid

Extract residue was dissolved in 2n HCL and then filtered. 1ml of this solution was transfer to separating funnel and then washed with 10 ml chloroform. After that PH of the

### Vinca alkaloids

*Vinca* alkaloids are a subgroup of drugs obtained from the Madagascar periwinkle plant. They are usually extracted from the pink periwinkle plant. It is a flowering plants in the family Apocynaceae. It is also called as "Sadaphuli or Sadabahar" *Vinca* alkaloids belong to an important class of anticancer drugs. It contain anti-mitotic and anti-microtubule alkaloid agent. It is produced synthetically. The plant contains indole alkaloids, including vinblastine, which was found to have anti- tumor properties. It is also used to treat an immune system cancer, Hodgkin's lymphoma. Vincristine is used to treat the leukemia disease in children. *Vinca* alkaloids are chemically indole alkaloids. *Vinca* alkaloids are a organic compounds made up of CO<sub>2</sub>, N<sub>2</sub> and O<sub>2</sub> that is often derived from plants is named alkaloid. Although, the name represents alkali like some do not exhibit alkaline properties. Many alkaloids having poisonous characteristics have physiological effects too that make them useful as medicines. The previous group of the plant alkaloids groups that used to treat cancer are the *vinca* alkaloids. There are mainly 4 *vinca* alkaloids in clinical use: Vinblastine (VBL), vinorelbine (VRL), vincristine and vindesine (VDS), but only VCR, VBL and VRL are approved for use in the United States. there is also a new synthetic alkaloid such as vinflunine that is currently approved in Europe for medicinal treatment.

### Vinca rosea

The leaves of *vinca* have been found as antibacterial properties and the crude leaf extract has anticancer properties. *Vinca* root is also used as anticancer. The other part of plant such as seeds, flower petals exhibit antioxidant properties. Due to the bitter and astringent leaves used as vomitive. The roots of *vinca* have been used as depurative, purgative, vermifuge, hemostatic and toothache remedy.

### Drug

- Vindesine
- Vincristine
- Vinblastine
- Vinorelbine



Fig.1. Vinca Rosea Plant.

### Biological sources:

- The botanical name is *Vinca rosea*.
- It belongs to family Apocynaceae.
- The biological source of *vinca* or sadafuli is the dried entire plant and aerial part of *Catharanthus roseus* Linn.
- It also known as *catharanthus*, Madagascar periwinkle.

### Chemical Constituents

*Vinca* contain indole alkaloid in large amount, mostly vinblastine and vincristine.

*Vinca* also contain other alkaloid such as lochnerine, ajmalicine, serpentine as a chemical compound. When coupling of indole alkaloids such as catharanthine and vindoline occur, they produced *vinca* alkaloid

### Morphological Features

- The colour of leaves is green.
- This plant is perennial.
- The colours of the flower are pinkish white or carmine red, violet.
- Roots are pale grey in colour.
- Odour- *Vinca* has characteristic odour.
- Taste- *Vinca* has bitter in taste.
- Leaves are oppositely arranged.
- Fruits of *vinca* are follicles with numerous black seed, fruits are divergent follicle.

### Botanical Name

*Catharanthus roseus*, *Pisum sativum*, *Brassica juncea*, *Allium cepa*

### Geographical source

India, Endemic to Madagascar.

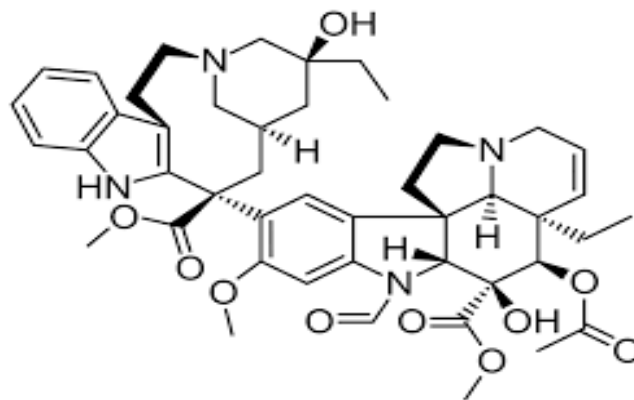


Fig. 2. Vinca alkaloid

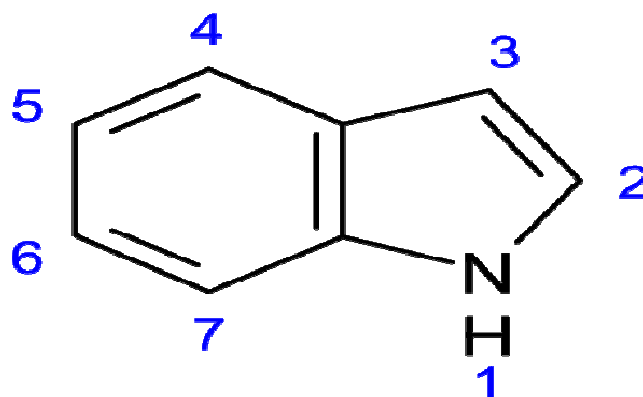


Fig.3. Indole alkaloid

## Medicinal Properties

### Flowers

- Extract used for eyewash in infants.
- Asthma.

### Leaves

- The leaves of vinca plant are used as a vomitive.
- Used to treat in diabetes because it enhance secretion of insulin.
- Young leaves for stomach cramps.

### Root

- It also has antibacterial, antifungal properties.
- Purgative, depurative, hemostatic, vermifuge.
- For dysentery.

## Therapeutic Properties

**Anti-bacterial property-** The crude extract of vinca plant has antibacterial properties. Vinca rosea contains two active compounds, the alkaloids and the tannins. The plant has more than hundred alkaloids, of which vincristine and vinblastine are most notable for their medicinal benefits.

**Anti-diabetic property-** Ethanolic extracts of the vinca leaf and flower of *C. roseus* showed a dose dependent lowering of blood sugar in comparative to the standard drug glibenclamide.

### How to use

- The fresh leaves of sadabahar or sadhaphuli can be dried, powdered and stored in an air-tight container. Consume one teaspoon of this dried leaf powder with a cupful of fresh fruit juice / water daily. The powder may bitter in taste
- Take not more than 3 to 4 leaves of the plant and chew them to manage blood sugar levels through the day.
- Take the pink coloured flowers of the vinca plant and boil them in a cupful of water. Strain the water and then drink it every morning on an empty stomach.

**Anti-cancer property-** Vinca alkaloids are used in chemotherapy for cancer. They are a category of cell cycle specific cytotoxic drugs that work by inhibiting the ability of cancer cells to divide: Acting upon tubulin, they prevent it from forming into microtubules, a necessary component for cellular division. The *vinca* alkaloids thus prevent microtubule *polymerization*, as opposed to the mechanism of action of taxanes.

Vinca alkaloids are produced synthetically and used as drugs in cancer therapy and as immunosuppressive drugs. These compounds include vinblastine, vincristine, vindesine. According to researched vinca alkaloids include vincaminol, vineridine, and vinburnine.

Throughout cell-division, vinca alkaloid molecules bind to the building blocks of a protein called tubulin, inhibiting its formation. The drugs work in the M-phase of cell reproduction. Tubulin protein generally works in cells to create "spindle fibers" (also called microtubules). These microtubules provide cells with both the structure and flexibility they need to divide and replicate. Without microtubules, cells cannot divide. The mechanism of vinca alkaloid's is in a nutshell: by occupying tubulin's building

block structure, vinca alkaloids prevent cancer cells from successfully dividing

**Anti-oxidant property-** Anti oxidant that inhibit oxidation. It is a chemical reaction that produce free radical, the ethanolic extract of roots of the varieties of *C. roseus* namely *rosea* (pink flower) and *alba* (white flower) was obtained.

**Anti helminthic property-** antihelminthics are a group of antiparasitic drugs that expel parasitic worms. Helminthes infections are the chronic illness, the ethanolic extract was found to show the significant anti helminthic activity.

**Antihypertensive property-** Antihypertensive drug used to treat lowering of blood pressure. Leaves extract of vinca plant made significant change in hypotensive.

**Anti-diarrheal property-** Anti-diarrheal is a substance its helps to control the diarrhea and slow passages of stool through intestine. Vinca play important role in diarrhea. Leaf extract of vinca as tested in the rats (wistar) with castor oil and it showed inhibition of castor oil induced diarrhea.

**Hypolipidimic effect -** The leaf juice of *Catharanthus roseus* (Linn.) G. Donn has been found that reduction in the serum levels of total cholesterol, triglycerides, LDL-c, VLDLc and histology of aorta, liver and kidney with.

## CONCLUSION

It is concluded that Vinca is used for many diseases such as cancer, kidney. It has antibacterial, anti-diarrheal, Hypolipidimic, antihypertensive and anti-oxidant property. It's also used to regulate menstrual cycle. So this plant used for medicinal purpose.

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