Overview on a Vinca Alkaloid & Its Medicinal, Therapeutic Properties

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ABSTRACT

The "medicinal plant" involves various types of plants used in herbal medicine. This plant used for medicinal purposes. It is a 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

INTRODUCTION

Alkaloids
Alkaloids are a class of natural products that occur in a wide variety of plants. They are the most diverse group of compounds found in nature and play a crucial role in the biological processes of plants. Alkaloids are characterized by the presence of nitrogen in their structure, which is usually bonded to carbon or sulfur. They are classified into several subgroups based on their chemical structure and biological activity.

Properties of alkaloids
1. Alkaloids are mainly found in leaves, flowers, and roots. They are present in varying amounts in different parts of the plant.
2. Alkaloids are insoluble in water and soluble in organic solvents like ether or chloroform.
3. Alkaloids are known for their distinct and characteristic odours.
4. Alkaloids are generally colourless or yellow in colour.

Function of alkaloids
1. They act as regulatory growth factors.
2. They are involved in the development of plants.
3. Some alkaloids are used as insecticides, fungicides, and herbicides.
4. Alkaloids are used as dyes and pigments.

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 alkaloid precipitating agent, for example H₂PtCl₆, 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 of 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 transferred 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 plant 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 organic compounds made up of CO₂, N₂ and O₂ 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 deputative, purgative, vermifuge, hemostatic and toothache remedy.

**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 perennia.
- 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. 1. Vinca Rosea Plant.](image1)

![Fig. 2. Vinca alkaloid](image2)

![Fig. 3. Indole alkaloid](image3)
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 sadaphuli 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 vincamolin, vineridine, andvinburene.

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- anti helminthics 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 passage of stool through intestine. Vinca play important role in diarrheal. 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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