AN OVERVIEW OF CATHARANTHUS ROSEUS LINN.

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ABSTRACT:

Medicinal plants are godsend gift to humans since they are used to treat existing and emerging ailments either directly or indirectly. Catharnthus roseus (L) G. Don is well-known medicinal plant belonging to the family- Apocynaceae that have been traditionally used as medicine since ancient times. C. roseus is well recognized herbal medicine due its anticancer bisindole alkaloids (vincristine, vinblastine, vindesine). It is evergreen plant first originated from islands of Madagascar. But commercially grown widely in India, Australia, Africa and South Europe. This legendary splendid plant provided the path for new research works. It has prolific varieties having great aesthetic value. This herbaceous plant has produced nearly 130 alkaloids mainly vincristine, vinblastine, ajmalicine, vincine, reserpine, raubasin, etc... Now a day' s many research reports are coming out about its pharmacological properties. This medicinal plant exhibits various pharmacological properties such as anticancer activity, antidiabetic activity, antimicrobial activity, antioxidant activity, anti-diarrheal activity, antihelminthic activity, antimalarial activity, antihypertensive property, anti-gonorrheal property, antiatheroscletotic activity, biopesticidal activity, phytoremediation property, hypolipidemic activity, memory enhancement activity, antiulcer activity, anti Alzheimer activity, wound healing property and as a cardiovascular drug. According to our opinion that it may be help scientists, ayurvedic practioners, pharmacognocists, botanists, researchers, and students who are active in the field of medicinal plants research. The purpose of the current study is to document updated data about its traditional and modern uses.

KEYWORDS: catharanthus roseus; plant description, pharmacognostical studies, pharmacological studies.

INTRODUCTION:

Figure: 1 (Catharanthus roseus plant)

Medicinal plants are the boon of nature to cure a number of ailments of human beings. These plants have a long history of usage in traditional medicine. The dependence of human beings on plants dates back to the start of human race. Medicinal plants are common source of medicine. Solid evidences can be cited in favor of herbs being used for the treatment of diseases and for restoring and fortifying body systems in ancient system of medicine such as ayurvedic, unani, and Chinese traditional medicine. The authentic knowledge of the usage of medicinal plants passed from one generation to another, after refining and addition. The folk recipes are prepared either from the whole plant or from their different organs, like leaf, stem, bark, root, flower, seed, etc. and also from their secondary product such as gum, resins, and latex. Many countries in the world, that is, two third of world population depends on herbal medicine for primary health care. The reason for this is because of their better cultural acceptability, better compatibility, and adaptability with the human body and poses lesser side effects. Catharanthus roseus is evergreen ever blooming herb which has its origin in central Madagascar Island. Periwinkle is recorded for as back as 50 B.C. in folk medicine literature of Europe as diuretic, hemorrhagic and wound healing. It was introduced to many parts of the world in 18^{th} century. It is believed to be brought in India by the Portuguese mercenaries in the middle of the 18^{th} century in Goa. Presently it is cultivated in India, Europe, China, and America. The plant has spread all over tropical and subtropical parts of India and grows wild all over the plains and lower foothills in Northern and Southern hills of India. In Malaysia it is locally called as kemunting cina. The periwinkle logo as symbol for hope for the cancer patients is used by National Cancer Council of Malaysia.

The name catharanthus roseus derived from Latin words kathoras (pure) and anthos (flower), referring to the neatness and beauty of the flower. Reichenbach, in 1935, first recognized and generically separated the existing genus catharanthus from vinca and designated it as lochnera.George Don, in 1935assigned it in the name catharanthus L.G.Don.

The name catharanthus comes from Greek for ‘ pure flower’ and roseus means red, rose, rosy. It is known as ‘ Sadabahar’ meaning ‘ always in bloom’ and is used for worship. The plant is an important source of indole alkaloids, which are present in all parts of plant[1].

HISTORY:

Peckolt, in 1910, described the use in Brazil of an infusion of the leaves to control hemorrhage and scurvy, as a mouth wash for toothache, and for healing and cleaning of chronic wounds. In Europe related species have been used for the proprietary suppression of the flow milk. In British West Indies it has been used to treat diabetic ulcer and in has been reported as being an effective oral hypoglycemic agent. More recently, Chopra et al. have reported that the total alkaloids posses a limited antibacterial activity as well as a significant and sustained hypotensive action. The hypoglycemic antibacterial activities have not been confirmed, although one of the alkaloids isolated from this plant, has been reported to posses transient depressor action on arterial blood pressure[2].

PLANT DESCRIPTION:[3]

SYNONYMS:

Madagascar periwinkle, Cape periwinkle, pink periwinkle, rose periwinkle, graveyard, bright eyes, sadabahar, barmasi, old maid.

GEOGRAPHICAL SOURCE:

Catharanthus roseus is native to the Indian Ocean of Madagascar. In many tropical and subtropical regions worldwide it has been introduced as a popular ornamental plant. It commercially cultivated in Spain, United States, China, Africa, Australia, India, and Southern Europe for its medicinal uses. The drugs derived from this plant find major markets in USA, Hungary, West Germany, Italy, The Netherlands, and UK.

HERBARIUM:

SCIENTIFIC CLASSIFICATION:

Domain **:** Eukarya- eukaryotes
Kingdom **:** Plantae - plants
Subkingdom **:** Trancheobionta – vascular plants
Superdivision : Spermatophyta – seed plants
Division **:** Magnoliophyta – flowering plants
Class **:** Magnoliopsida - dicotyledons
Subclass **:** Asteridae
Superorder **:** Gentiananae
Order **:** Gentianales
Family **:** Apocynaceae - dogbane
Subfamily **:** Rauvolfioideae
Tribe **:**Vinceae
Genus **:** Catharanthus G.Don
Specific epithet **:** Roseus (Linnae)G. Don
Botanical Name **:** Catharanthus roseus (Linnaeus) G. Don

VERNACULAR NAME:

Table:1

Country	**Common Name**
India	Sadaphul, Ushamanjairi, Nityakalyani, Nayantara, Periwinkle, Sadabahar, Ainskati, Billaganneru, periwinkle
Philippines	Atay-biya, Chichirica, Kantotan, Tsitsirika
Brazil	Boa-noite
West Indies	Brown man’ s fancy, Old maid, pink flower, Ram goat rose, Red rose, Sailors flower
Dominica	Caca poule
Guatemala	Chatilla
Peru	Chavelita
Vietnam	Dua can
Venda	Liluvha

Madagascar	Madagascar periwinkle
Kenya	Maua
Sri Lanka	Mini-mal, patti-poo
Bangladesh	Nyantra
Japan	Nichinich-so
Mexico	Ninfa
Guyana	Periwinkle
Jamaica	Periwinkle
USA	Periwinkle
French Guiana	Pervenchede
Thailand	Phaeng phoi farang
Pakistan	Sada bahar
Rodrigues Islands	Saponaire
Cook Islands	Tiare-tupapaku-kimo
Europe	Vinca branca
Spain	Vinca rosada
Gujarat	Barmasi
Bangladesh	Noyontara

BOTANICAL DESCRIPTION:

It is an herbaceous plant or an evergreen subshrub growing to 32 in 80 cm high. It has glistening, dark green and flowers all summer long. The flowers are naturally appear pale pink with a purple eye in their centres. Erect or accumbent suffrutex, to 1m. usually with white latex. Stems is green, often permeate with purple or red.

Figure: 2 (Various part of catharanthus roseus plant)

Leaves:

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

Flowers:

4-5cm, white or pink, with a purple, red, pale yellow or white centre follicle 1.2– 3.8* 0.2-0.3cm. Susceptible on the axial side

Seeds:

1-2 mm, are numerous and grooved on one side

CULTIVATION PRINCIPLES:

Catharanthus roseus prefers sunny and hot condition and grown widely in sandy loams in full sunlight to part shade.

Climate, soil and propagation

Flowering period:

Throughout the year in equatorial conditions and from spring to late autumn, in warm temperate climates.

Soil: Full sun and well drained soil is preferred.

Light:

Bright light, included three or four hours of direct sunlight daily, essential for good flowering.

Temperature:

Normal room temperature is suitable at all times. It cannot tolerate temperature less than10

Watering:

Water the potting mixture plentifully, but do not allow the pot to stand in water.

Feeding:

As the flowering begins, apply stand liquid fertilizer every two weeks. Plants are not tolerant of excessive fertilizer.

Irrigation:

They need regular moisture, but avoid overhead watering. It should be watered tolerably during the growing season, but it is relatively drought resistant once entrenched. They will regain after a good watering.

Fertilizing:

The plants are not heavy breeder. If necessary, feed biweekly or once monthly with a fair amount fertilizer. Too much fertilizing will produce abundant foliage instead of more blooms.

IN VITRO CULTIVATION OF CATHARANTHUS ROSEUS: [4]

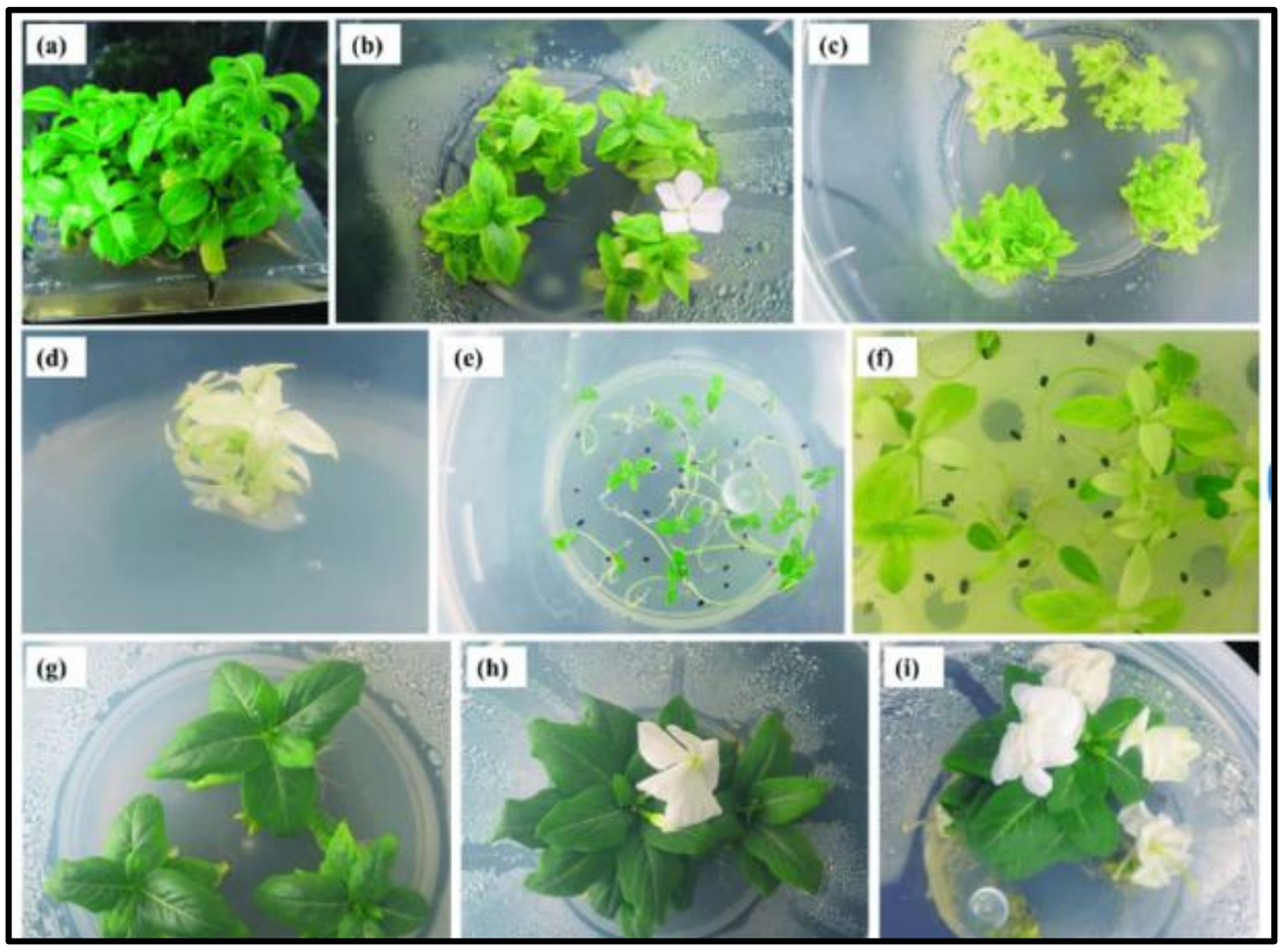
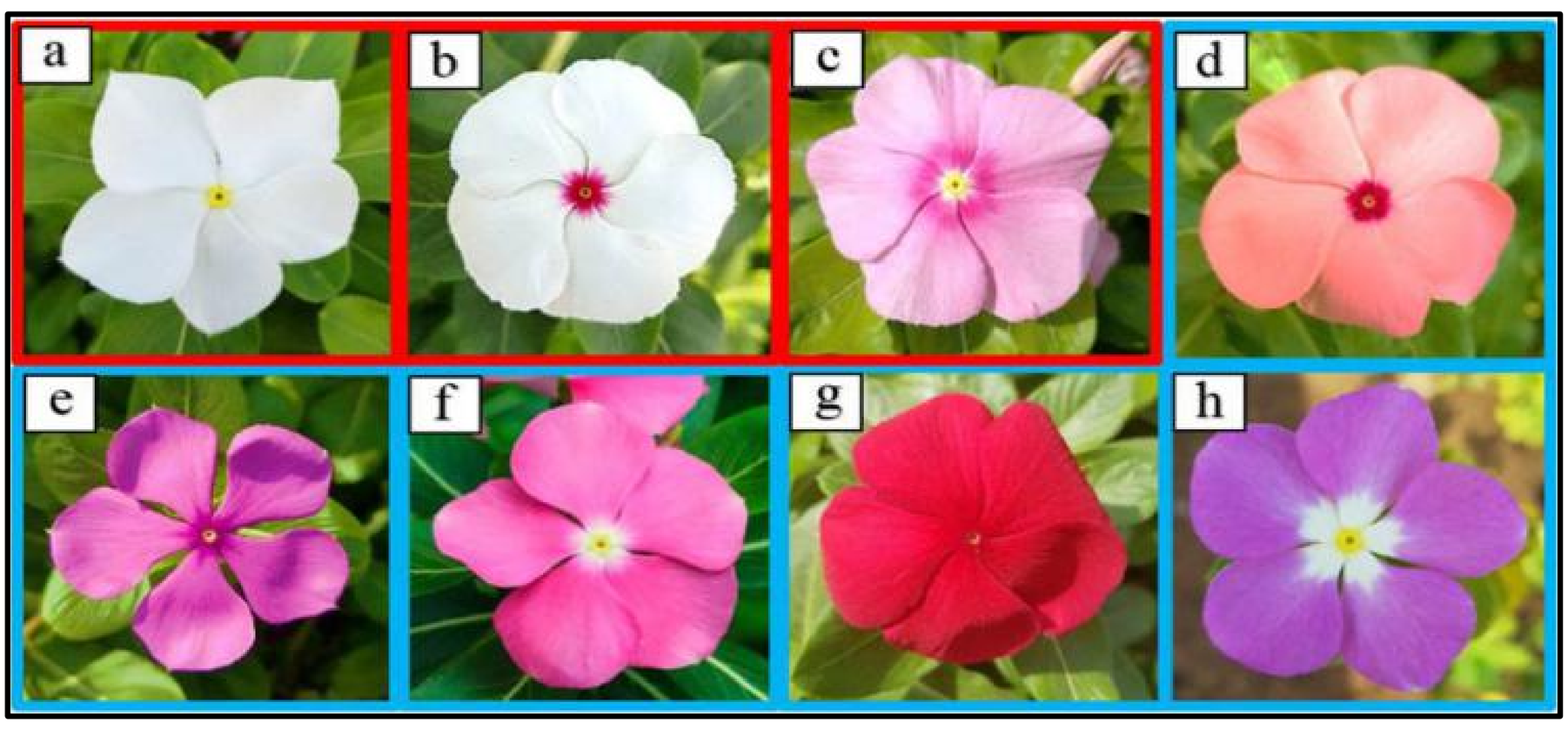


Figure: 3 (In vitro cultivation of C.roseus)

In vitro propagation of catharanthus roseus. (a) Multiple shoots produced from nodel segments of C.roseus cultivated on MS medium. (b) in vitro flowers produced from the multiple shoots regenerated on MS medium and 5% sucrose; (c) somaclonal variation in C.roseus; (d)multiple albino shoots produced from nodel segments isolated from the variant shoot cultivated on MS medium; (e) seeds obtained from normal green plantlets were germinated on MS nutrient medium; (f) seeds obtained from somaclonal variant plantlets were germinated on MS nutrient medium; (g) root induction from a shoot cultivated on MS medium with (h) 3% sucrose and (i) 5% sucrose.

VARIETIES OF CATHARANTHUS ROSEUS:



Photographs of eight varieties of catharanthus roseus;

a) Patricia white(PW)
b) First kiss polka Dot(FKD)
c) First kiss peach (FKP)
d) Experimental rose pink (ER)
e) Experimental deep pink (ED)
f) Cooler orchid (CO)
g) Victory red (VR)
h) Blue pearl (BP)

SPECIES OF CATHARANTHUS: [5]

Figure: 5 (species of C. roseus)

Table: 2

S.NO	**Name of the catharanthus species**	**Origin**
1	C.roseus L.G.Don	Madagascar, now naturalized
2	C.ovalis Markgraf	Madagascar
3	C.trichophyllous	Madagascar
4	C.longifolius Pichon	Madagascar
5	C.coriaceous	Madagascar
6	C.Lanceous Bojer ex	Madagascar
7	C.saitulus Pichon	Madagascar
8	C.pusillus Murray G.	India and Sri

ECONOMIC VALUES:

In the year 1990 the world market consumed 5-10 kg 0f vincristine with a total value of US$25-50 million. In the year 1991 the world market consumed 3-5 t of ajmalicine, with a total value of US$4.5-7.5 million. It was estimated that in 2005 the world market was at US$150- 300 million. Oncovin and velban are the two most important anticancer drug isolated from C. roseus are sold for a total US$100 million per year.

CYTOLOGY, REPRODUCTION AND GENETIC DIVERSITY:

The chromosome number of all species of the genus catharanthus is 2n=16. Due to colchicines treatment doubling of chromosome number tetraploidy, has been induced that resulted in an increase in TIAs, larger stomata, branches and leaves, although there was reduced pollen fertility and poor seed set compared with diploid plants.Catharanthus roseus is unique species because of its self compatibility, unlike most of the other species in the family. However, intraflower self- pollination does not normally occur in periwinkle because of the physical separation between the sigma and anthers, a phenomenon known as reverse herkogamy, when the sigma is recessed below the level of anthers. Although many aspects of alkaloid biosynthesis have been investigated, the genetic variation between accessions relation to alkaloid content and the effect of breeding for flower color or growth habit on the levels of vinblastine and vincristine are still poorly understood [6].

PHARMACOGNOSTICAL STUDIES:

MACROSCOPICAL CHARACTERISTICS:

I. Leaves

Colour : Dark green

Size : Length – 1 to 9 cm; Width- 0.5 to 6cm

Shape : Lanceolate to ovate

Nature : Brittle

II. Stems

Colour : Green

Size : Length-30 to 60 cm

Nature : The stems are erect or procumbent

III. Flowers

Colour : Red, violet and white in colour

Size : Width – 3 to 7 cm

Nature : Bisexual flowers

Ovary : Unilocular and superior ovary

MICROSCOPICAL CHARACTERISTICS:

Leaf is dorsiventral. Transverse section of the leaf shows the following two regions.

a). Lamina (upper epidermis, mesophyll, lower epidermis)

i. Upper epidermis: Outer wall of epidermal cells are covered with a cuticle. Anisocytic stomata are found. The trochomes present are unicellular and have a sharp apex.

ii. Mesophyll: It contains palisade cells and spongy parachymatous tissues. Palisade cells are found only below the upper epidermal layer. Closely packed without any spaces. Spongy paranchymatous tissue is made up of 5 to 8 layers (loosely arranged).

iii. Lower epidermis: anisocytic stomata are present more in number when compared to upper epidermis.

b). Midrib:It contains collenchymatous tissue and vascular bundles.

i. Collenchymatous tissue- made up of thick walled, cellulosic, collenchymatous cells. It present beneath the upper epidermal layer and above the lower epidermal layer.

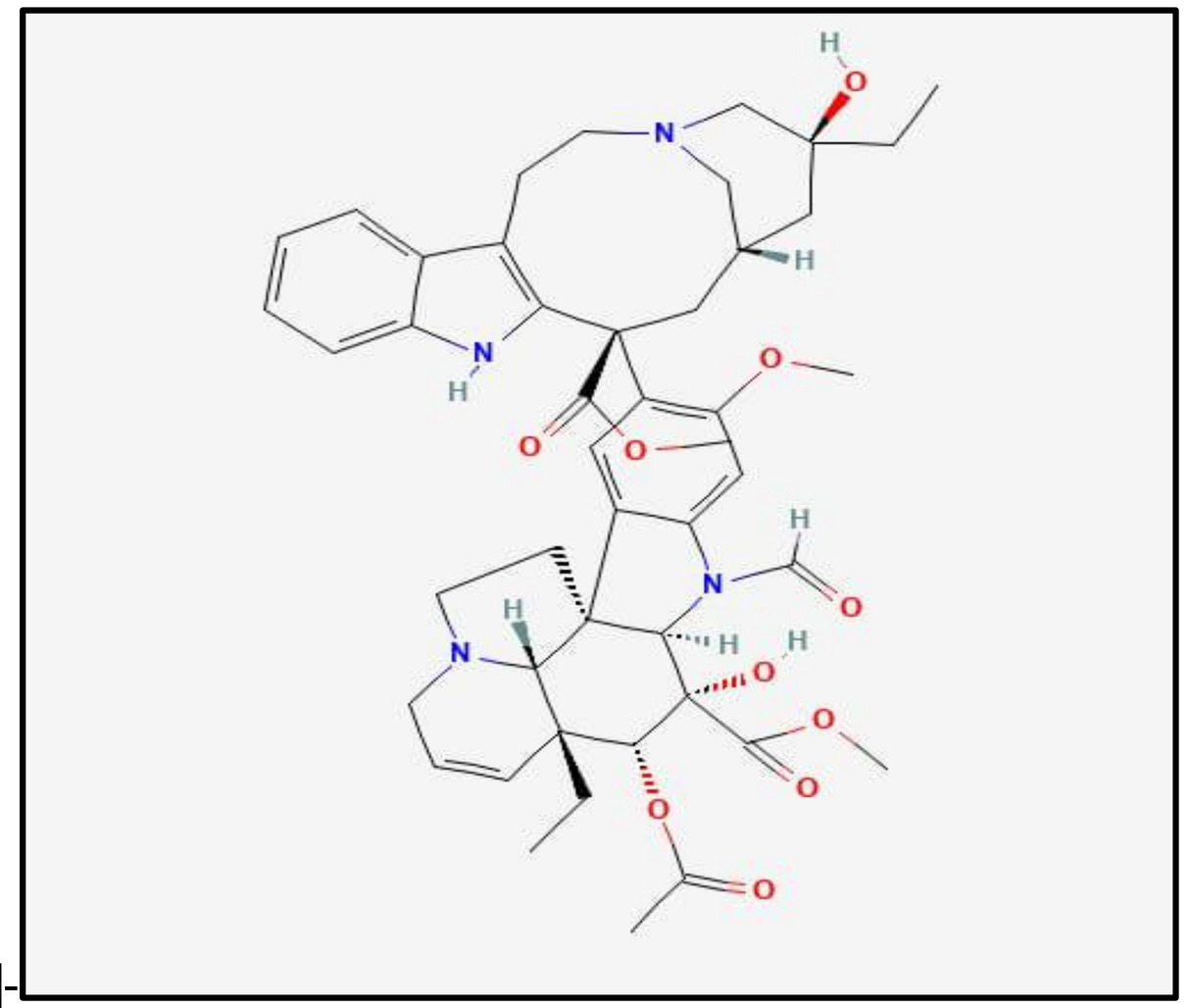
ii. Vascular bundles- both xylem and phloem make up the vascular bundles. Xylem is lignified and phloem is non lignified. Calcium oxalate crystals are absent in catharanthus leaves.

POWDER CHARACTERISTICS:

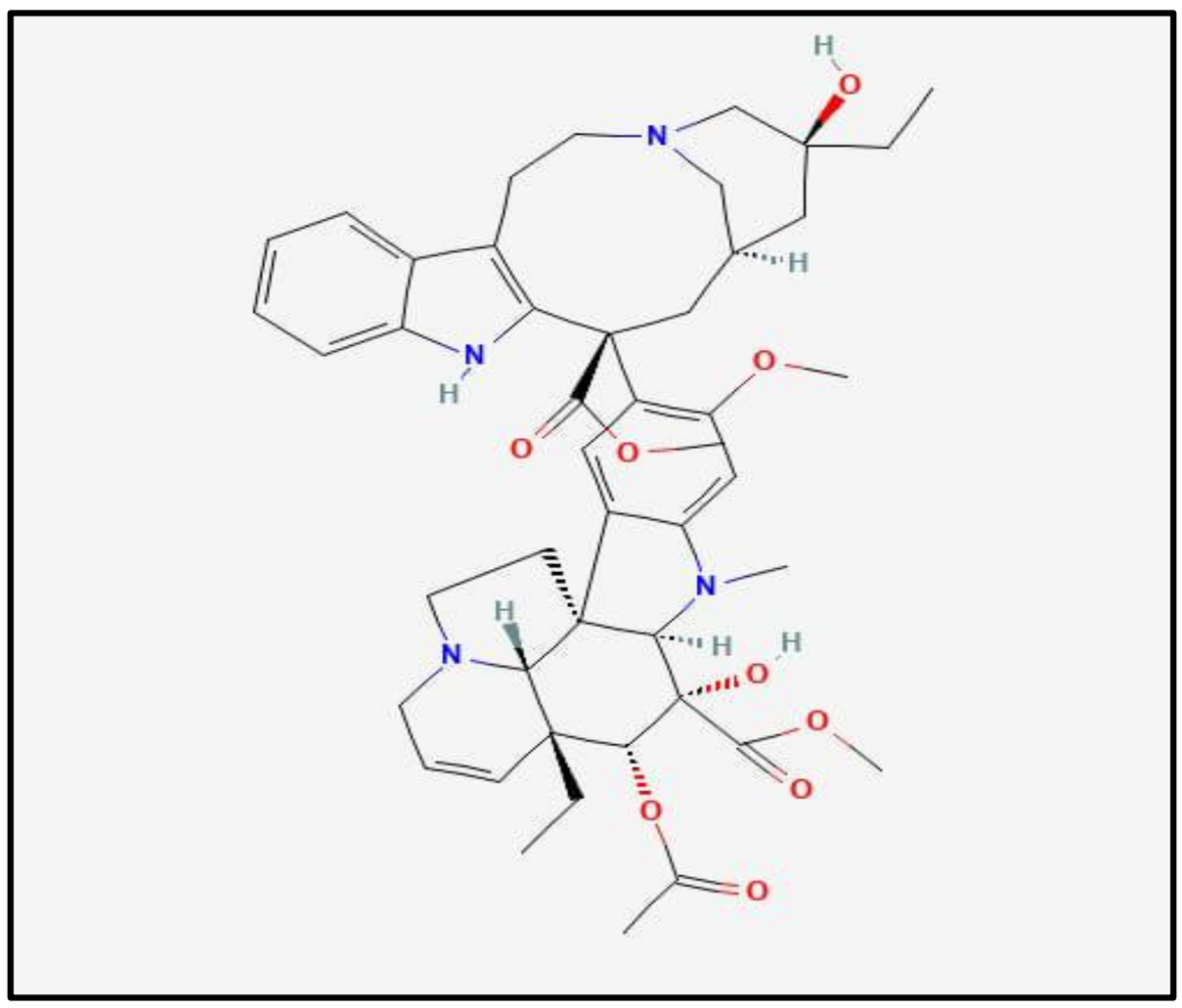
It shows fragments of upper epidermis in surface view with straight anticlinal walls and anomocytic and anisocytic stomata, patches of lower epidermis with sinuous anticlinal walls and same types of stomata.

CHEMICAL CONSTITUENTS:

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



1) Vincristine [7]-



2) Vinblastine [8]

Catharanthus roseus contains several phytocompounds of pharmacological importance such as carbohydrate, flavonoid, tannin, saponin, glycoside, terpenoid, protein, phenol and alkaloids. The plant contain more than 400 alkaloids and alkaloids are more potentially active chemical components of the plant used in pharmacological activities, flavor, and fragrance, ingredients, food additives, pesticides and agro chemicals. More than monoterpenoid indole alkaloids are produced by these plants in different organs. Arial part of the plant contain several alkaloids like vindesine, vindeline, tabersonine, actineoplastidemeric whereas basal or root parts of the plant contains raubasin, reserpine,

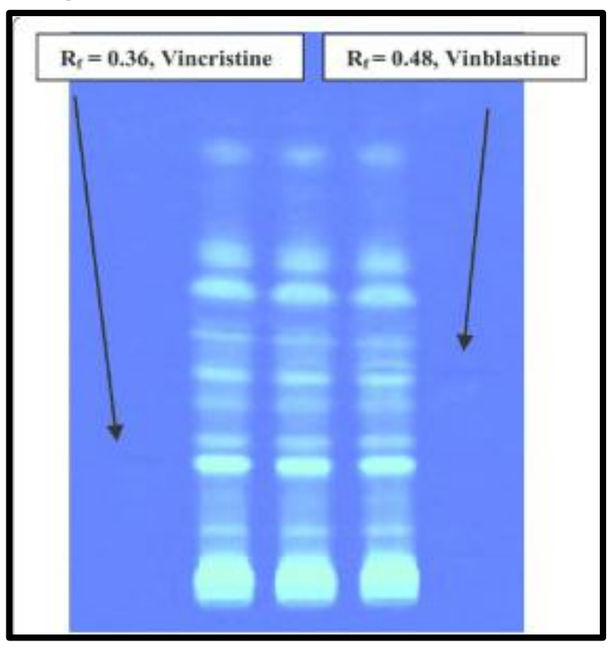
catharanthine, vincamine, and ajmalicine. Hejjden et al., reported that vindoline is the principle component other compounds are reserpine, vincamine, alstonine, 22-oxovincaleukoblastine, vintsine, leurosine, vinomine, vinoxine. Leaves are rich in alkaloids and carbohydrates. Flowers of plant were rich in tannins, triterpenoids and alkaloids are responsible diabetic wound healing property. Flowers of C. roseus contain an anthocyanidin pigment rosinidin. Terpenes or terpenoids indole alkaloids have been identified as active anti-cancer, anti- inflammatory, anti-bacterial, anti- protozoal, and anti malarial agents in many pharmacological studies.

Table: 3

Plant Name	**Name of Alkaloids present**
Leaf	Catharanthine, Vindoline, Vindolidine, Vindolicine, Vindilinine, Ibogaine, Yohimbine, Raubasine, Vinblastine, Vincristine, Leurosine, Lochnerine.
Stem	Leurosine, Lochnerine, Catharanthine, Vindoline,
Root	Ajmalicine, Serpentine, Catharanthine, Vindoline, Leurosine, Lochnerine, Reserpine, Alstonine, Tabersonine, Horhammericine, Lochnericine.
Flower	Cataranthine,Vindoline, Leurosine, Lochnerine, Tricin.
Seeds	Vingramine, Methylvingramine.

IDENTIFICATION BY TLC:

Vinblastine is identified by TLC by spotting standard and sample and developed in mobile phase n-Butanol: Acetic acid: Water; 5:1:1 and spraying with modified dragondroff' s reagent. Rf value of 0.24 corresponds to Vinblastine in both standard and sample solution tract[9].



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ANALYTICAL METHODS:

The analytical method is similar as identification by TLC except precoated plates of silica gel 60F254 are used and after developing. Densitometric scan of the plate is done at 560 nm. Percentage of vinblastine can be calculated from peak area under the curve.

QUANTITATIVE STANDARDS:[10]

Foreign organic matter: Not more than 2.5%

Ash: Not more than 14.6%

Acid insoluble ash: Not more than 1.0%

Alcohol soluble extractive: Not less than 12.0%

Water soluble extractive: not less than 40.0%

TRADITIONAL MEDICINAL USES OF CATHARANTHUS ROSEUS:

In traditional medicine[11], C. roseus has been used to treat a variety of ailments in different parts of the world where the plant has naturalized.

Table: 4

Countries	Used as
Australia	Hot water extract of dried leaves is taken orally for menorrhagia, diabetes, extract of root bark is taken orally as febrifuge.
Brazil	The hot water extract of dried entire plant is taken orally by human for diabetes mellitus.
China	Hot water extract of the aerial parts is taken orally as menstrual regulator.
Cook Island	Decoction of dried leaves used orally to treat diabetes, hypertension and cancer.
Dominica	Hot water extract of leaves is taken orally by pregnant woman to combat primary inertia in childbirth and the boiled leaves are drink to treat diabetes.
England	Hot water extract of dried entire plant is taken orally for the curing of diabetes.
Europe	Decoction of dried leaves is taken orally for diabetes mellitus.
France	Hot water extract of entire plant is taken as an antigalactogue.
French guina	Hot water extract of entire plant is taken orally as a cholagogue.
India	The hot water extract of entire plant is taken orally by human for cancer. Hot water extract of dried leaves is taken orally to Hodgkin’ s disease. The root extract is taken orally for menorrhagia.
Jamaica	Hot water extract of dried leaves is taken orally for diabetes.
Kenya	Hot water extract of dried leaves is taken orally for diabetes.
Mexico	Infusion of whole plant is taken orally for stomach problem.
Nozambique	Hot water extract of leaves is taken orally for diabetes and rheumatism and the root extract is taken orally as hypotensive and febrifuge.
North Vietnam	Hot water extract of the Arial parts is taken orally as a menstrual regulator.
Pakistan	Hot extract of dried ovules is taken orally for diabetes.

Peru	Hot water extract of dried entire plant is taken orally by human adults for cancer, heart disease and leishmaniasis.
Philippines	Hot water extract of root is taken orally by pregnant woman to abortion.
South Africa	Hot water extract of dried leaves is taken orally for menorrhagia and diabetes.
South Vietnam	Hot water extract of entire plant is taken orally by human adults as an antigalatogogue.
Taiwan	Decoction of dried entire plant is used orally by human adults to treat diabetes mellitus and liver disease.
Thailand	Hot water extract of dried entire plant is taken orally for diabetes.
USA	Hot water extract of leaves are smoked as a euphoriant.
Venda	Water extract of dried root is taken orally for venereal disease.
Vietnam	Hot water extract of dried arial parts is taken orally as drug in Vietnam' s traditional medicine, listed in Vietnam' s pharmacopoeia.
West indies	Hot water extract of leafy stems is taken orally for diabetes.
Zimbabwe	Hot water extract of crushed roots is taken orally for stomach.

MODERN USE OF CATHARANTHUS ROSEUS:

ANTICANCER ACTIVITY:

In clinical practice, the administration of C. roseus is carried out intravenously, after which they are eventually metabolized by the liver and excreted. Hair loss, peripheral neuropathy, constipation and hyponatremia are the major side effects of this drugs. To improve the therapeutic index, semi synthetic catharanthus alkaloids such vinorelbine, vinflunine were developed. Vinorelbine and vinflunine exert their antitumour effect by binding to tubulin.

These alkaloids have growth inhibition affect some tumours. Vinblastine is used experimentally for treatment of neoplasmas and is recommended for Hodgkin' s disease, chorio carcinoma. C. roseus was found to show the significant activity against numerous cell types invitro condition and especially greatest activity was found against the multidrug resistant tumour types.

Vinca alkaloids are also called as mitotic spindle poisons they inhibit assembly of the spindle forms from the microtubules, thereby inhibiting mitosis in cell cycle. Vinca alkaloids hence successfully prevent cancer cells from dividing. Different vinca alkaloids have their own unique properties[12].

ANTIDIABETIC ACTIVITY:

Hypoglycemic activity was found by using the dichloromethane; methanol extract of (1:1) of the leaves and twigs of C. roseus plant in streptozotocin induced diabetic rat model at dose of 500mg/ kg that has been administered orally for 7 and 15

days. 48.6 and 57.6% hypoglycemic activity was observed and further treatment for period of 30 days has provided complete protection against STZ challenge (75 mg/ kg/i.p.).

Enzyme activities of glycogen synthase, glucose-6-phosphate-dehydrogenase, succinate dehydrogenate and maleate dehydrogenase were found to be decreased in the liver of diabetic animals which would be significantly improved after treatment with extract at dose 500mg/ kg p.o. for 7 days. Results indicated the increased metabolization of glucose in treated rats with the increased levels of lipid per oxidation.

The ethanolic extracts of the leaves and flower of C. roseus revealed that a dose dependent decreasing of blood sugar is similar to the standard drug. Decreasing of blood sugar in comparable to the standard drug glibenclamide. The hypoglycemic action has been arosed due to the result of the increase glucose utilization in the liver[13].

ANTIMICROBIAL ACTIVITY:

C.roseus discovered to be an important medicinal plant for the creation of the novel pharmaceuticals as most of the bacterial pathogens were improving resistance against many of the available anti microbial drugs. Plants have been justified to be valuable natural resources for the active chemotherapeutic agents and suggest a broad spectrum of action with the greater emphasis on the preventive action. It is demonstrated that mutant leaf extracts had good antibacterial potential against s.aureus, s.citrius, 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[14].

ANTIOXIDANT ACTIVITY:

The antioxidant potential of the ethanolic extract of the roots of the two varieties of c. roseus namely rosea (pink flower) and Alba (white flower) was obtained by using different system of assay such as hydroxyl radical-scavenging activity, DPPH radical-scavenging activity and nitric oxide radical inhibition method. The result obtained proved that the ethnolic extract of the roots of periwinkle varieties has exhibited the satisfactory scavenging effect in the entire assay in a concentration dependent manner but C. roseus was found to posses more antioxidant activity than that of C. Alba[15].

ANTIDIARRHOEAL ACTIVITY:

The in vivo anti diarrheal action of C. roseus ethanolic leaf extract was tested in the Wister rats with castor oil as an experimental diarrhea inducing agent in addition to the pretreatment of the extract. Loperamide and atropine sulphate were used as the standard drugs. The antidiarrheal effect of ethanolic extract of C. roseus showed the dose dependent inhibition of the castor oil Induced diarrhea at the doses of 200 and 500mg/kg[16].

ANTIHELMINTHIC ACTIVITY:

Helminthes infections are chronic illness, affecting human beings and cattle. Catharanthus roseus was found to be used from the traditional period as an antihelminthic agent. The antihelminthic property of C. roseus has been evaluated by using pheritima posthuma as an experimental model with piperizine citrate as the standard reference[17]. The plant has been reported to posses vermifungal properties. Dried leaves incorporated into the soil produce nimaticidal and ovisitic effects.

ANTIULCER ACTIVITY:

Vindoline and vincamine alkaloids of the plant showed anti ulcer property. The alkaloid vincamine, present in the plant leaves shows cerebrovasodilatory and neuroprotective activity. The plant leaves proved for anti ulcer activity against experimentally induced gastric damage in rats[18].

ANTIMALARIAL ACTIVITY:

Chloroform extract of vinca rosea roots at a dose 400mg/kg wastaken orally with water extract at a dose 4.42gm/kg to chicken produce weak activity on plasmodium gallinaceum[19].

HYPOTENSIVE PROPERTY:

Extract of leaves of the plant made significant change in hypotensive. The leaves have been known to contain 150 useful alkaloids among other pharmacologically active compounds. Significant antihyperglycemic activity and hypotensive activity of the leaf extracts (hydro alcoholic or dichloromethane methanol) have been reported in laboratory animals[20].

HYPOLIPIDIMIC ACTIVITY:

In study, 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, vipocetine like compound present in leaf juice of catharanthus roseus (Linn.) G. Donn[21].

ANTIGONORRHEA PROPERTY:

Bapedi traditional healers highly utilize it for gonorrhea might provide a useful lead to the discovery of new affordable and readily available plant based gonorrhea treatment[22].

ANTIATHEROSCLEROTIC ACTIVITY:

In study, significant antiatherosclerotic 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 Cantharanthus roseus(Linn)G.Donn[23].

BIOPESTICIDAL PROPERTY:

Biological extract of solvent extracts of catharanthus roseus were evaluated against larvae of gram pod borer Helicoverpa armigera (Lepidoptera: Noctuidae). Ethyl acetate fractions of leaf extract of C. roseus was found to be a potent biopesticide. Insecticidal properties of catharanthus roseus have also been reported. The pupicidal action of plants was evaluated by treating the pre-pupal stage of spodoptera litura with the leaf extract of catharanthus roseus by topical application method.73,33,49,33,33,28.00 and 17.33percent mortalitywas observed when pre-pupae were treated with 2.0, 1.5, 1.0, 0.5 and 0.1% of leaf extract of C. roseus respectively(Sandey and SudhaSummarwar,2016)[24].

PHYTOREMEDIATION PROPERTY:

Phytoremediation used to remove pollutants from environment components. Observed that the impact of cadmium and lead on catharanthus roseus. They concluded that during germination the toxic effects of cadmium and lead with respect to C. roseus are the maimum and the plant gradually becomes more resistant to these heavy metals as it attains maturity. The phytoremediation potential of catharanthus roseus with respect to chromium has been analyzed. C. roseus was shown to absorb upto about 38% of the amount chromium present in primary and secondary sludge amended soil through roots and accumulate it to about 22% in leaves, thereby, proved useful in the reclamation and remediation of chromium contaminated soil and land. Catharanthus roseus has been used for lead and nickel phytoremediation by Subhashini and Swamy[25].

MEMORY ENHANCEMENT ACTIVITY:

Nayak et al., [26] vinpocetine, made from the alkaloid called vincamine is the most interesting dietary supplement because of its action to improve brain function and memory which are particularly beneficial in treatment of Alzheimer’ s disease. In clinical trials it has been studied that in dementia and stroke, vinpocetine at doses upto 60 mg/d has been well tolerated and no significant adverse events were observed. Warfarin, aspirin as well as some dietary supplements like ginkgo, vitamin E and garlic the blood thinning agents should not be combined with vinpocetine.

ANTI- ALZHEIMER’ S DISEASE:

Vinpocetine has been reported to have a variety of actions that would hypothetically be beneficial in Alzheimer’ s disease. The aqueous extract of C. roseus leaf, stem and root has been shown to effectively inhibit AchE in an in- vitro micro assay. Additionally, serpentine, an alkaloid presents in C. roseus leaf, stem and root displayed a strong activity against AchE. These findings revealed that this plant is a potential source of active compounds for the pharmacological management of neurogenerative conditions including Alzheimer’ s disease[27].

WOUND HEALING PROPERTY:

Wound healing is a process of repair that injury to the skin and other soft tissue. Describe that the ethanolic extract of vinca rosea have wound healing property mostly when treated to wounded rats and its property was due to increase tensile strength and hydroxyproline content present in the granulation tissue. It supported the use of plant extract in the management wound healing. The juice of vinca rosea leaves was reported that it is more effective to reduce total cholesterol, LDL-c, VLDL in serum levels, triglycerides and histology of liver aorta, kidney and show atherosclerotic activity. The methanol leaf extract of vinca rosea show wound healing activity in streptozotocin induction diabetic mice at a concentration of 200 and 400mg/kg[28].

AS A CARDIOASCULAR DRUGS:

The roots of the plant were found to accumulate ajmalicine and serpentine, which are the important components of medicines that are used for controlling the high blood pressure and other types of the cardio-vascular maladies[29].

SIDE EFFECTS OF CATHARANTHUS ALKALOIDS:

Some side effects are show of this plant during uses. We know that the VLB have bone marrow suppression gastrointestinal toxicity, extravasation injury and potent vesicant. In case of patient who is suffering from the bacterial infections are prescribed to take this drug. Mother cannot breast feeding to the infants because of its potential secretion into breast milk. Vinblastine show to be toxic and mutagenic in animal studies and it is also carcinogenic and it should not be used during pregnancy in ladies. Madagascar periwinkle can be dangerous if we take orally. It cause hallucinogens and is cited such as in the Louisiana state act 159.

Vincristine injection: hives, rash, itching, difficulty breathing or swallowing, constipation, increased or decreased urination, swelling of the face, arms, hands, feet, ankles, or lower legs, unusual bleeding or bruising, unusual tiredness or weakness, pain, numbness, burning, or tingling in the hands or feet, difficulty walking or unsteady walking, muscle or joint pain, sudden changes in vision, including loss of vision, hearing loss, dizziness, loss of the ability to move muscles and to feel a part of the body, hoarseness or loss of ability to speak loudly, seizures, jaw pain[30].

Vinblastine: fever, sore throat, chills, or other signs of infection, unusual bleeding or bruising, sores in the mouth, unusual tiredness or weakness, pain, numbness, burning, or tingling in the hands or feet, difficulty walking or unsteady walking, difficulty breathing, hearing loss, seizures, chest pain[31].

MARKETED PRODUCTS OF VINCA ALKALOIDS: [32]

- Marqibo – for blood cancer
- Navelbine – for lung cancer and advanced breast cancer
- Velban – for lymphoma and cancer of the breast or testicles
- Vinblastine – for Hodgkin’ s lymphoma and non- Hodgkin’ s lymphoma
- Vincristine — for leukemia, acute myeloid leukemia, Hodgkin's lymphoma and Non- Hodgkin's lymphoma
- Vincristine liposomal – used as antineoplastic agent
- Vinorelbine – for non small cell lung cancer

CONCLUSION:

Catharanthus roseus is one the 21000 important medicinal plants found. It is used for the cure of a number of diseases such as diabetes, sore mouth, mouth ulcers and leukemia. Anti-leukemic activity is shown vinblastine and vincristine. Different parts of this plant produce different amount of alkaloids, out of which root bark produces the maximum i.e. nearly 1.79%. There are a number of reports supporting its antimicrobial activity against staphylococcus albusi, basillus megaterium, shigella, and pseudomonas. The plants have a large number of phytochemical constituents that can be used for a variety of medicinal purposes. The plant also posses various properties such as anti-cancerous, anti-diabetic, anti- helminthic, anti-diarrheal, anti-microbial, anti-oxidant, bio-pesticidal, phytoremediation. Demend of medicinal plant products has increased and its cost is affordable. These have fewer side effects compared to other medicines.

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