A Review On Pharmacological Uses Of Vincaherbal Plant

Saurabh Devchand Jambhulkar[1], Payal Kuldip Indurkar[2]
[1, 2]Maharastra Institute Of Pharmacy (D.Pharm) Betala, Bramhapuri Dr.Babasaheb Ambedkar Technology University Lonere

Abstract- *A medicinal plant called Vincarosea has been used for centuries to cure a number of illnesses. Vincristine and vinblastine, two of its more than 70 alkaloids, have demonstrated considerable promise in the treatment of cancer, diabetes, and other disorders. This review article seeks to condense the most recent information on V. rosea's applications and usage in the management of various illness situations. There is evidence to support the use of V. rosea and its alkaloids in the treatment of leukemia, lymphoma, and solid tumors due to the substantial research done on its anticancer qualities. The microtubule-inhibiting properties of vincristine and vinblastine are known to cause cell cycle arrest and death in cancer cells.These substances are now utilized to treat a variety of cancers in conjunction with other chemotherapeutic medicines.It has also demonstrated hypoglycemic characteristics, with studies indicating that it may increase insulin production, improve glucose absorption by cells, and prevent hepatic glycogen breakdown. These outcomes could help in the management of diabetes and its consequences. Enhancing memory and cognitive function as well as treating hypertension, are two possible advantages. Its vasodilator actions might result in increased blood flow and lowered blood pressure, while its capacity to boost oxygen delivery to the brain could enhance cognition and memory.*

Keywords: *Rice husk ash, Sugarcane Bagasse Ash, Cement replacement, Compressive strength, Workability, Sustainable concrete*

I. INTRODUCTION

The Apocynaceae family includes the tropical plant Catharanthus. There are eight species Catharanthusroseus is the most utilized due to its medicinal qualities. More than 130 distinct terpenoid indole alkaloids (TIAs), some of which have potent pharmacological effects, are produced by this plant. C. roseus is both aesthetically pleasing and therapeutic, with the ability to cure a variety of ailments. With the exception of C. pusillus, all but one of the species are unique to Madagascar (Van der et al., 2004).Due to its medicinal qualities, Vincarosea has been utilized in Ayurvedic medicine for millennia. The plant includes alkaloids that have been demonstrated to have benefits against diabetes, hypertension, and cancer(1).V. rosea-based Ayurvedic formulations have been used to treat a variety of ailments, such as diabetes, hypertension, and cancer. The herb has also been utilized for its antioxidant, anti-inflammatory, and analgesic properties. Overall, V. sea is still being studied for its potential use in both contemporary pharmacology and Ayurvedic medicine.The plant V. rosea, also known as KemuntingCina in Malaysia, is utilized both asan attractive and therapeutic plant. The vinca alkaloids, which are the oldest type of indole alkaloids and are used to cure cancer, are produced by it in more than 70 distinct varieties.Hodgkin's lymphoma and pediatricleukemia are treated With chemotherapy using the anti-neoplastic substances Vincristine and vinblastin, which are both produced from The V. rosea plan. Peripheral Neuropathy, hair loss, hyponatremia, and constipation Are some of the negative effects of vinca alkaloids, which Prevent cellular mitosis. Aside from non-small lung Cancer, they are also used to treat diabetes, hypertension, And malaria. Antibacterial, antioxidant, anti-diarrheal, Hypolipidemic, and wound-healing properties are also Displayed by V. rosea(2).

FIG. 1: Different Types of VincaRosea Flowers

SCIENTIFIC CLASSIFICATION OF VINCA PLANT

Botanical Name(s): VincaRosea (Catharanthusroseus)
Family Name: Apocynaceae

Kingdom: Plantae Division: Magnoliophyta (Flowering plants)
Class: Magnoliopsida (Dicotyledons)
Order: Gentianales
Family: Apocynaceae
Genus: Catharanthus
Species: C. rose

PARTS OF VINCA PLANTS:

FIG. 2: Leaves

Vincarosea (also known as Catharanthusroseus or Madagascar periwinkle) leaves are an important medicinal part of the plant and are widely studied in pharmacognosy and pharmaceutical sciences. The leaves are simple, opposite, oval to oblong in shape, with a smooth margin and a glossy dark green surface, often having a prominent pale midrib. They contain valuable indole alkaloids such as vincristine and vinblastine, which are extensively used in the treatment of various cancers, including leukemia, lymphoma, and breast cancer. Apart from anticancer activity, Vincarosea leaves also exhibit antidiabetic, antihypertensive, antimicrobial, and antioxidant properties due to the presence of flavonoids, tannins, and phenolic compounds. In traditional medicine, leaf extracts have been used to manage diabetes and wound healing. Because of their high therapeutic value, Vincarosea leaves are considered a significant natural source of life-saving drugs in modern medicine.

FIG. 3: Stems

Vincarosea (Catharanthusroseus) stems are herbaceous, erect to spreading, and well-branched, forming a compact to slightly bushy plant. The stems are smooth, glabrous (hairless), and green when young, often becoming slightly woody at the base as the plant matures. They contain abundant latex and are rich in medicinally important alkaloids such as vincristine and vinblastine, which are synthesized mainly in aerial parts including the stem. Internodes are clearly visible, supporting opposite, glossy leaves, and the stems play an important role in transport and storage of bioactive compounds. Due to their pharmacological significance, Vinca stems are widely studied in pharmaceutical and medicinal plant research.

FIG. 4: Flower

Vincarosea (commonly known as periwinkle, Madagascar periwinkle, or Catharanthusroseus) is a medicinal flowering plant belonging to the family Apocynaceae. The flowers are attractive, usually pink, white, or pale purple, with a characteristic five-petaled, wheel-shaped (salverform) structure and a contrasting central eye. These flowers are bisexual and actinomorphic, arising singly from the leaf axils. Vincarosea flowers are especially important in pharmaceutical science because the plant is a rich source of valuable indole alkaloids such as vincristine and vinblastine, which are widely used as anticancer drugs in the treatment of leukemia, Hodgkin's lymphoma, and other cancers. The plant flowers throughout the year in tropical and subtropical climates, is drought-tolerant, and is commonly cultivated as an ornamental as well as a medicinal plant.

FIG. 5: Roots

Madagascar periwinkle or Sadabahar, has roots that are medicinally important in traditional and modern medicine. The roots contain several bioactive alkaloids such as ajmalicine, serpentine, and reserpine-like compounds, which are known for their antihypertensive and sedative properties. Root extracts have been traditionally used in Ayurveda and folk medicine for the treatment of diabetes, high blood pressure, digestive disorders, and nervous system ailments. Pharmacologically, the alkaloids present in the roots exhibit vasodilatory activity, helping to improve blood circulation and reduce blood pressure. Additionally, Vincarosea roots show antimicrobial, antioxidant, and anti-inflammatory effects, supporting their therapeutic value. Due to the presence of potent alkaloids, the roots must be used carefully, as excessive or improper use can lead to toxicity.

PHARMACOLOGICAL USES OF VINCA PLANT :

V. rosea is an important medicinal plant due to its wide range of pharmacological effects. There are many alkaloids in the plant, and studies have shown that they have anti-inflammatory, antitumor, and antimicrobial properties. These substances function by preventing cell proliferation, interfering with DNA synthesis, and lowering inflammatory responses in the body. Additionally, V. rosea contains phenolic acids, terpenoids, and flavonoids, all of which have antioxidant characteristics and can help shield the body from oxidative stress. The plant is being researched for its possible utility in treating a number of medical illnesses, including cancer, diabetes, and Alzheimer's disease. It has also been discovered to have neuroprotective and cardioprotective benefits. To completely comprehend V. rosea's pharmacological characteristics and its advantages and disadvantages, additional study is nonetheless required(3).

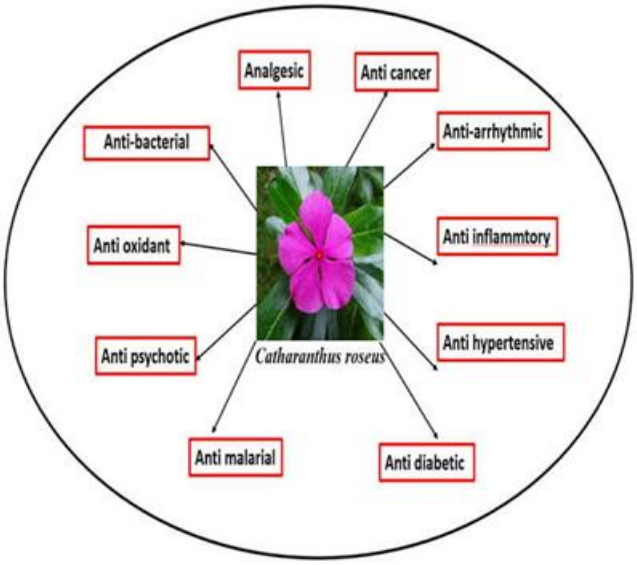

FIG. 6: Pharmacological Uses of Vinca Plant

1. ANALGESIC ACTIVITIES:

V. rosea has long been used as an analgesic to lessen pain. The plant includes a number of alkaloids, including vincristine and vinblastine, which have been shown to have pain-relieving properties. These alkaloids function by attaching to opioid receptors in the brain and spinal cord, which lessens the transmission of pain signals. V. rosea has been proven to be useful in treating neuropathic pain, such as that brought on by diabetes, and it also lessens post-operative pain. To completely comprehend V. rosea's analgesic effects and discover the best doses for pain management, additional study is necessary. It is crucial to remember that V. rosea can be harmful if ingested in big doses and should only be used under the supervision of a healthcare provider(4).

2. ANTIHPYRETIC ACTIVITIES:

The antipyretic (fever-reducing) qualities of V. rosea have been employed historically. According to recent research, the plant has bioactive substances that can lower fever by preventing the creationof prostaglandins, which are in charge of raising body temperature. In one investigation, it was shown that a V. rosea extract greatly reduced fever in rats. To completely comprehend the mechanism of action and possible efficacy of V. rosea as an antipyretic, additional study is necessary. It is crucial to remember that fever is a normal immunological reaction and that, in some circumstances, such as during infections, it could be required for the body to fight off microorganisms. As a result, V. rosea shouldn't be used to treat fever without first consulting a medical expert (5).

3. ANTI-INFLAMMATORY:

Numerous inflammatory disorders, including asthma, rheumatism, and arthritis, have historically been treated using V. rosea in many different cultures. Numerous anti-inflammatory substances, including as alkaloids, flavonoids, and phenolic acids, have been found in the plant, according to studies. These substances function by preventing the synthesis of inflammatory mediators such as prostaglandins, leukotrienes, and cytokines, which lowers inflammation and discomfort. Animal models of arthritis and asthma have shown V. rosea to have anti-inflammatory properties, and it has also been proven to be successful in lowering inflammation in human cell cultures (6).

4. ANTIOXIDANT ACTIVITIES:

The antioxidant-rich components of V. rosea include a number of flavonoids, alkaloids, and phenolic acids.These substances have been demonstrated to scavenge free radicals, unstable chemicals that may harm cells through oxidative stress and have a role in the onset of chronic illnesses, including cancer, diabetes, and heart disease. The leaves, flowers and roots are used in Ayurvedic medicine. Chinese medicine uses the extract of the plant for diseases such as diabetes,malaria,leukemia and hodgkins disease.In traditional medicinethe leaf juice has been used to treat wasp stings,a gargle is used for sore throats,flower extracts are used for infants eye wash.Periwinkle tea is used to treat diabetes and cough. The leaves and stems are the source of alkaloids that have anti-tumor and anti cancer properties.The alkaloids also offer sedative and tranquilizing properties.it relieves muscle pain and depression because of its property of detoxification and counteracting poison ,it is used to relieve wasp stings.This plant controls nose bleed,bleedinggums,mouth ulcers and sore throats.It is useful in treating gastritis ,cystitis,enteritis,diarrhea,diabetesetc when taken internal (8).

5. THERAPEUTIC USES:

V. rosea Modern studies have validated the therapeutic potential of V. rosea, which has been historically utilized for its medicinal benefits. The herb has been used to treat a number of illnesses, including cancer, diabetes, and hypertension. Several forms of cancer have been successfully treated with chemotherapy using its alkaloids, vincristine and vinblastine. Additionally discovered to have anti-inflammatory and antioxidant effects, V. rosea may be used to treat chronic illnesses. V. rosea can also be used to treat bronchitis, coughs, and menstruation issues. V. rosea should only be taken under the supervision of a skilled healthcare expert since it can be harmful if ingested in big doses (9).

6. CANCER:

Historically, V. rosea has been used to cure cancer because of its cytotoxic qualities. The two primary alkaloids found in it, vincristine and vinblastine, have been used in chemotherapy for a number of cancers, including Hodgkin's disease, leukemia, and breast cancer.

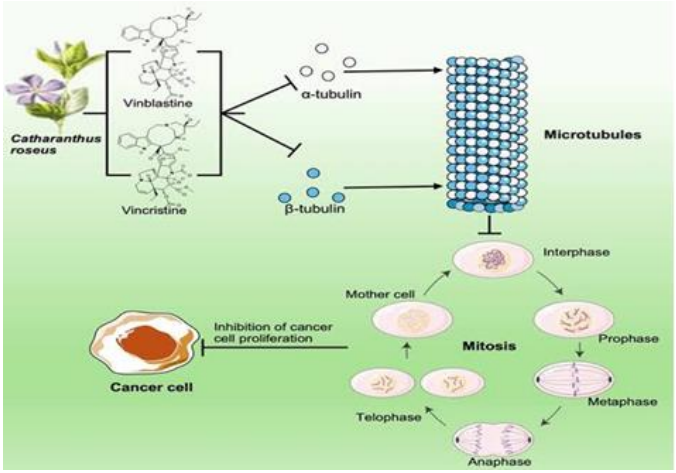

FIG. 7: USE OF VINCA PLANT ON CANCER

In addition, V. rosea extracts have been shown to exhibit anti angiogenic and apoptotic properties, which means they can slow the development of blood vessels that feed tumors and cause cancer cells to undergo programmed cell death. V. rosea's therapeutic potential in the treatment of cancer is still being investigated despite the need for additional study to completely understand the mechanisms of action and potential adverse effects (10).

CAUSES OF CANCER:

Three types of foreign agents that we consume interact with genetic factors to cause cancer:

I. Physical Carcinogens:

Anupam Saini, Manish Kumar, Shailendra Bhatt, Vipin Saini and Anuj Malik, ―Cancer Causes and Treatments‖, Vol. 11(7): 3121-3134, JPSR (2020).Ionizing radiation such as radon, ultraviolet rays from sunlight, uranium, radiation from alpha, gamma, beta, and X-ray-emitting sources (11).

II. Chemical Carcinogens:

Compounds like nitrosamines, asbestos, cadmium, benzene, vinyl chloride, nickel, and benzidine and contains about 60 known potent cancer-causing toxins or chemicals in

cigarette smoking or tobacco consumption, a drinking water contaminant (arsenic), a food contaminant (aflatoxin) (12).

III. Biological Carcinogens:

Infections from certain bacteria, viruses, or parasites and Pathogens like human papillomavirus (HPV), EBV or Epstein-Barr virus, hepatitis B and C, Kaposi's sarcoma-associated herpesvirus (KSHV), Markel cell polyomavirus, Schistosoma spp., and Helicobacter pylori. Aging is also the cause of cancer. Age is the common incidence of cancer, which dramatically rises. Genetics are the commonest cause for cancer or tumor-like Ovarian, breast, prostate, skin cancer, colorectal cancer. (13)

7. DIABETES:

Due to its ability to reduce blood sugar levels, V. rosea has long been utilized in the treatment of diabetes. Alkaloids in the plant, including vincristine and vinblastine, have been proven to promote the release of insulin from pancreatic cells and boost cellular absorption of glucose. In addition, V. rosea includes substances that might enhance insulin sensitivity and lessen insulin resistance, both of which are important risk factors for the onset of diabetes. V. rosea has promise as a natural medicine for controlling blood sugar levels in diabetics, yet further research is required to properly grasp its potential therapeutic advantages in the treatment of diabetes (14).

DIABETES TYPES:

The common causes of diabetes are detailed below:

- Type1 DM is due to an absolute lack of insulin and has an autoimmune basis. This disorder was previously known as insulin-dependent diabetes mellitus (IDDM) until the reclassification of diabetes mellitus based on etiopathology. An immune mediated destruction of b cells is the hallmark of the disorder, and hyperglycemia only ensues when 90% of b cells are lost (15).
- Type2 DM is the commonest form of diabetes and accounts for 90–95% of cases. It develops secondary to a relative insulin deficiency but the primary defect is insulin resistance (16).

8. HYPERTENSION :

Traditional medicine has utilized V. rosea to treat hypertension and high blood pressure. Alkaloids found in the plant, such as vincamine and ajmalicine, have been demonstrated to have vasodilatory effects, which means they can dilate blood vessels and lower blood pressure. These substances also have antiplatelet action, which can lessen the risk of cardiovascular illnesses by assisting in the prevention of blood clot formation. To fully comprehend the potential advantages of employing V. rosea in the treatment of hypertension and to establish the ideal dosage and administration, additional study is necessary. It is crucial to get medical advice before taking V. rosea, as with any medication for hypertension (17)

9. NEUROLOGICAL DISORDER :

Since ancient times, V. rosea has been used in traditional medicine to treat a number of neurological conditions, such as epilepsy, Parkinson's disease, and Alzheimer's disease. The plant includes a variety of alkaloids and flavonoids, which have been shown to have neuroprotective and neuroregenerativequalities. It has been investigated if the alkaloid vinpocetine, which comes from the V. rosea plant, may be used to treat memory problems and cognitive deficits. Antioxidant and anti inflammatory qualities of the plant may also help lower the risk of neurological illnesses. Even though additional study is required to properly understand V. rosea's therapeutic potential in treating neurological diseases, the plant's lengthy history of usage in traditional medicine suggests that it would be a worthwhile area to investigat (18).

10. LEUKEMIA:

Approximately 10% of all cancers in the United States are hematologic in origin . This category of diseases Can involve nearly any cellular component of the immune system, but the most commonly diagnosed are Multiple myeloma, B-cell chronic lymphocytic leukemia (CLL), acute myeloid leukemia (AML), and the broad Category of non-Hodgkin lymphoma (NHL)[1]. In the past decade, aggressive research in this area has Generated a variety of new therapeutic approaches, many of which have led to viable treatment options for Patients with leukemias and lymphomas. These recent advances can be credited not only to significant Improvements in our understanding of tumor cell biology, but also to high-throughput screening and medicinal Chemistry strategies to identify and produce diverse new agents for preclinical investigation. Additionally, Enormous effort has been put into defining patient subsets within each disease using genetic or cell-surface Markers and studying how these different subsets respond to treatment. While this approach is intended to "personalize" medicine and provide the most effective treatment for each patient, it also has the significant benefit of enhancing our understanding of the underlying

biology of cancer. Each molecular characteristic of Aggressive disease that is identified and validated can expose a new therapeutic target for investigation and Intervention. In the present review, we highlight several plant-derived compounds that have established clinical uses in Treating hematological malignancies. Following this, examples of plant compounds in clinical trials and agents Under preclinical development will be provided. Silvestrol, an oxygen heterocyclic belonging to the rocaglate Compound type, is of special interest and provides an example of a plant natural product in the process of Development toward clinical testing (19).

11.ANTILEUKEMIC ACTIVITY:

Vincristine is employed to treat lymphocytic acute leukemia (the most frequent malignhomeopathy in childhood), of which several chromosomic alterations with prognostic importance are known. Among them there are the translocation and the translocation which are indicators of a bad prognosis, while hyperdiploidy is associated with a good prognosis and it attacks lymphomas including solid tumours in children (20).

12. HEMATOLOGIC ACTIVITY :

Overall survival for adult hematologic cancer patients has improved during the past decades due to new treatment options, and more than 80% of children with acute lymphoblastic leukemia (ALL) are now long-term survivors . This therapeutic success, however, comes with the cost of more people experiencing early and late-onset adverse effects, consequently affecting the recovering patient's QOL, which is especially important in children with a long expected lifespan after treatment. Although the intensity of the symptoms may not be extensive, the inconvenience is not correlated, and QOL can be greatly impaired . Given the increasing numbers of cancer survivors, the clinical significance of chemotherapy-induced neuropathy is increasing; consequently, clinical and molecular risk predictors, prevention and treatment options, and measuring methods are urgently warranted . In this paper, we systematically review parameters related to vincristine induced neurotoxicity in hematologic patients (21).

13. MALARIA :

Malaria is one of the most common major health problem in tropical and developing countries of sub-Saharan Africa and south East Asia including India. It is major killing disease responsible for the death of millions of Children, pregnant women and adults. Malaria is caused by Plasmodium parasites. The parasites are spread to People through the bites of infected Anopheles mosquitoes, called "malaria vectors". There are four parasite Species that cause malaria in humans which are Plasmodium falciparum, Plasmodium vivax, Plasmodium Malariae and Plasmodium ovale.2 P.falciparum and P. vivax are the most common species clinically but P. Falciparum is the most deadly leading to many fatal complications including cerebral malaria. In 2010, malaria caused an estimated 6,60,000 deaths, mostly among African children. As per the latest WHO Estimates, there are 300-500 million new clinical cases globally and 1 million deaths occur due to malaria each Year . Treatment strategies of malaria aim to terminate the acute blood infection, to cure the clinical symptoms, to Clear hypnozoites from the liver to prevent future relapses and to prevent the spread of infection[4]. Radical Treatment and curative treatment comprise main aspects of treatment. Various pharmacological options Available for this purpose are Chloroquine, Mefloquine, Quinine, Primaquine, Artemisinin derivatives Pyremethamine, like artesunate, artemether, arteether and amino alcohols likeLumefantrine and Halofantrine Along with tetracycline, Doxycyclines and Sulfadoxime etc. The greatest problem associated with this Treatment is emergence of drug resistance which leads to treatment failure in significant number of cases (22).

USE OF HERBAL PLANTS IN THE VARIOUS TREATMENTS:

Apart from the pharmacological treatment, various options are being used since ancient times for many health Ailments. Nearly 80 % of the global population still depends upon the herbal drugs for their health care. In India, the use of several medicinal plants to cure specific ailments has been practiced since ancient times. Various cultural traditions are associated with use of wild plants as medicinal herbs. This medico-lore is passed Over generations traditionally all over the world. Reliance on plants is primarily due to their safety, Effectiveness, cultural preferences, inexpensiveness and abundant availability all the time. The medicinal Virtues of plants are identified by instinct/intuition or by trial and errors. Globally, traditional healers are using Various medicinal plants for the treatment of malaria; however, this practice is not really completely recognized By modern medicine. Knowledge about traditional medicinal practices and plants is currently transmitted from generation to Generation principally by word of mouth. Large number of plant species has been identified as anti-malarial Medicinal plants. In the present review, extensive literature review was done on the plants, which have been Identified as anti-malarial plants and the work done so far in evaluating their anti-malarial potential. A wide Variety of plants belonging to several families have been identified through ethnobotanical and ethno Pharmacological studies as anti-malarial medicinal plants.

This review is an attempt to present a comprehensive account of numerous medicinal plants used in the Treatment of malaria in either forms (23).

REFERENCES

[1] Allamsetty, J., Pedada, S., Pedada, N., &Dhanunjayarao, K. (2020). A basic review on Vincarosea. International Journal of Pharmacognosy and Chemistry, 1, 31-36.

[2] Almagro, L., Fernández-Pérez, F., &Pedreño, M. A. (2015). Indole alkaloids from Catharanthusroseus: Bioproduction and their effect on human health. Molecules, 20(2), 2973-3000. https://doi.org/10.3390/molecules20022973

[3] CatharantusRoseus – periwinkle. Tropiclab Inc. www.tropilab.com/periwinkle.html(acc essed 20 July 2008).

[4] Johnson IS, Armstrong JG, Gorman M, Burnett JP. The vinca alkaloids: a new class of oncolytic Res. 1963;23:1390–427. agents. Cancer Mohammed Fazil Ahmed, Syed Mohammed Kazim, Syed SafiullahGhori, SyedaSughraMehjabeen,

[5] Shaik Rasheed Ahmed et al. Antidiabetic Activity of Vincarosea Extracts in Alloxan-Induced Diabetic Rats. International Journal of Endocrinology.

[6] Dessisa D. Preliminary economic evaluation of medicinal plants in Ethiopia: trade, volume and price. Proceedings of the National Workshop on biodiversity Conservation and Sustainable use of Medicinal Plants in Ethiopia. Addis Ababa, Ethiopia. 2001, 176-188.

[7] Oskuie AE, Abdim F. Medicinal Plants Effective Against Anemia in Northwest Iran: A Review of Hematopoietic Medicinal Plants. Plant Biotechnology Persa. 2024 Jul 1;6(2). URL:

[8] CraggGM,NewmanDJ.Plantsasasourceofanti-cancer agents. J Ethnopharmacol. 2005;100:72–9. Bennouna J, Delord JP, Campone M, Nguyen L. Vinflunine. A new microtubule inhibitor agent. Clin Cancer Res. 2008; 14:1625-32.{scientific classifications}.

[9] Bhise Vishal Vishnu1, Kale Vidya Raosaheb2 1 Student of Yashodeep Institute of Pharmacy, ChhatrapatiSambhaji Nagar, Maharashtra, India. 2 Assistance Professor of Yashodeep Institute of Pharmacy, ChhatrapatiSambhaji Nagar, Maharashtra, India. (botanical)

[10] Therapeutic Applications and Diverse Uses of Vincarosea in Treating Various Disease Conditions: A Comprehensive Review Snigdha Srivastava1*, Anshu Verma2, Deepu3, Arjun Giri {pharmacological properties}

[11] Taher MA, Nyeem MA, Billah MM, Ahammed MM. Vinca alkaloid-the second most used alkaloid for cancer treatment A review. Inter. International Journal of Physiology, Nutrition and Physical Education. 2017; 2(2):723-7. [Link] {anticancer activity and toxicity}

[12] Kruczynski A, Hill BT. Vinflunine, the latest Vinca alkaloid in clinical development. A review of its preclinical anticancer properties. Critical Reviews in Oncology/Hematology. 2001; 40(2):159-73.

[13] Zhang Y, Yang SH, Guo XL. New insights into Vinca al kaloids resistance mechanism and circumvention in lung cancer. Biomedicine & Pharmacotherapy. 201796:659-66.

[14] A BASIC REVIEW ON VINCA ROSEA Jyotsna Allamsetty, SyamPrashanthPedada, NiroshaPedada,KolliDhanunjayarao. Department of Pharmacy ,Avanthi Institute of Pharmaceutical Sciences, Cherukupally (Vil), Bhogapuram (M), Vizianagaram (Dist), A.P-531162. {uses} Therapeutic Applications and Diverse Uses of Vincarosea in Treating Various Disease Conditions: A Comprehensive Review Snigdha Srivastava1*, Anshu Verma2, Deepu3,Arjun Giri { therapeutic uses}

[15] UAZMANALAM1*, OMAR ASGHAR1, SHAZLI AZMI1, AND RAYAZ A. MALIK1,2 1Centre for Endocrinology and Diabetes, Institute of Human Development, Central Manchester University Hospitals NHS Foundation Trust, Manchester, UK 2Weill Cornell Medical College in Qatar, Doha, Qatar { diabetes type}

[16] Verge CF, Gianani R, Kawasaki E, Yu L, Pietropaolo M, Jackson RA et al., Predicting type I diabetes In first degree relatives using a combination of insulin, GAD, and ICA512bdc/IA-2autoantibodiesDiabetes. 1996;45:926-33. {classification of diabetes mellitus }

[17] Anupam Saini, Manish Kumar, Shailendra Bhatt, Vipin Saini and Anuj Malik, ―Cancer Causes and Treatments‖, Vol. 11(7): 3121-3134, JPSR (2020).

[18] González-Burgos E, Gómez-Serranillos MP. Vincaalka loids as chemotherapeutic agents against Breast cancer. In: Brahmachari G, editor. Discovery and development of anti breast cancer agents from Natural products. Amsterdam: El sevier; 2021.

[19] Wild S, Roglic G, Green A, Sicree R, King. Global prevalence of diabetes: Estimates for the year 2000and projections for 2030, Diabetes Care. 2004; 27:1047-53.

[20] Medicinal Plants with Anti-Leukemic Effects: A Review Tahani Maher 1 ,RahaAhmadRaus1,Djabir Daddiouaissa 1,2 Elda Surhaida Latif 4, FeridAbdulhafiz 5 , Farah Ahmad 1 and Arifullah Mohammed5,* 1 , Noor SuhanaAdzhar 3

[21] Vincristine: Beyond on anticancer treatment Deepanshi Tiwari and Mamta Tiwari DOI: {Antileukemic activity\ Hematologic activity}
[22] Available from:Last accessed on 18th Jan 2013.
[23] Antimalarial drugs. KD Tripathi. Essentials of Medical Pharmacology. 6th Edition, 2006. Jaypee Brothers Medical Publishers (P) Ltd. Pp. 780 96.Herbal Plants Used For the Treatment of Malaria- A Literature Review Satish Bahekar1*, Ranjana Kale1 1. Department of Pharmacology, Mahatma Gandhi Institute of Medical Sciences, Sewagram, Wardha, Maharashtra 442102, India.