



Extraction Methods of Vincarosea...and its use in Cancer Therapy

Kendre S.S¹, Bavage S.B², Khawle B.M³, Shaikh S.J.⁴

Shyamliilla B. Bavage Department of Pharmacognosy, Latur, Sohel J. Shaikh Department of Pharmaceutical Chemistry Latur, Khawle B. M. Department of pharmacology Latur; all are attached with College of Pharmacy, Hasegaon

Abstract

Madagascar periwinkle *Catharanthus roseus* is an crucial tropical plant, which is determined to be very popular an ornamental plant in gardens and houses in the hotter elements of the arena, also referred to as "anticancer drug-generating plant" is a hot and humid plant of the Apocynaceae family. The plant bring together a network of different compounds that encompass extra than 130 one of a kind MIAs. It is the season to the give up garden plant and a special source of anti-most cancers drugs vincristine and vinblastine. Despite this, its leaves and roots collect other terpenoid indole alkaloids, which might be economically wanted. Production of drug molecules vindoline, catharanthine, ajmalicine and serpentine. The plant has been used in a variety of medicines with cost along with anti-diabetic, anti-ulcer, anti-bacterial, anti-oxidant and anti-diarrheal homes. The assessment describes pharmacological packages and phytochemicals of *C. Roseus*.

Keywords: Alkaloids, antioxidant, antibiotic, anticancer, *Catharanthus roseus*, Vincristine, Vinblastine.

INTRODUCTION

Medicinal flowers have a long records of conventional uses. Ethno-botanical information in medicinal flowers and their use in traditional cultures is beneficial to the protection of traditional cultures, biodiversity, society fitness care and drug development. *Catharanthus roseus* L. (G.) Don, an crucial medicinal plant that is part of circle of relatives Apocynaceae; this plant is dicotyledonous angiosperm also incorporates two alkaloids of terpene indole: vinblastine and vincristine used to fight most cancers [1].

Peckolt, in 1910, described the use in Brazil to give him leaves to manipulate bleeding and scurvy, as a manner to scrub the mouth toothache, in addition to recovery and cleaning of continual sicknesses wounds. In Europe associated species have been used pressure associated with milk float. British West Indies used to deal with diabetes and Philippines has been mentioned as a success mouthpiece hypoglycemic agent. Recently, Chopra et al.

Babes suggested that the overall amount of alkaloids has antibacterial houses essential and non-stop and non-stop hypotensive feature. Hypoglycemic and antibacterial activities also unconfirmed, even though one of the alkaloids is isolated in this plant, ajmalicine, has been reported to have it transient depressor action in arterial blood strain Periwinkle "or *Catharanthus roseus* (Apocynaceae Family), generally referred to as "Nayantara" or "Sadabahar", the call *Catharanthus* is based totally on the Greek language definition "pure flower." While, *roseus* manner purple, vivid or vibrant [2].

Scientific classification [3]:

- Botanical Name(s) : *Vinca Rosea* (*Catharanthus roseus*)
- Family Name: Apocynaceae
- Kingdom: Plantae
- Division: Magnoliophyta (Flowering plants)
- Class: Magnoliopsida (Dicotyledons)
- Order: Gentianales
- Family: Apocynaceae
- Genus: *Cantharanthus*
- Species: *C. roseus*

Vernacular names:

- English: cayenne jasmine, old maid, periwinkle
- Hindi: sada bahar, sadabahar
- Kannada : batla hoo, bili kaasi kanigalu, ganeshana hoo, kempu kaasi kanigalu
- Malayalam: banappuvu, nityakalyani, savanari, usamalari
- Marathi: sadaphool, sadaphul, sadaphuli
- Sanskrit: nityakalyani, rasna, sadampuspa, sadapushpi
- Tamil: cutkattu malli, cutukattu malli, cutukattuppu
- Telugu: billaganneru
- Gujarati : Barmasi
- Bengali: noyontara

DESCRIPTION

Periwinkle is the most common place plant found in it India is referred to as *Catharanthus roseus* and belongs to the Apocynaceae circle of relatives. That's a shrub it grows up to at least one-3 ft tall and clean, bright, blue leaves and plant life for the duration of 12 months. Periwinkle flowers are to be had in a selection of paperwork blue, red, violet, crimson, and white. These are flora originate within the North America, Europe, India, China. Almost all elements of periwinkle plant have scientific houses. Periwinkle is an effective plant quantity of medication. Every component of the plant belongs to the tree. However, alkaloids are very crucial targeted on bark roots. This includes three essential alkaloids *Rauvolfia* institution which are ajmalicine, reserpine and serpentine. More in those are some of the maximum important alkaloids located vindoline, vincristine, vinblastin. *Vinca rosea* used each in Ayurvedic medicine. And Chinese medicinal drug.

PRACTICE

- A lasting solution.

STEM

- Straight, Cylindrical, Branch, Solid, Red, Glabrous.

ROOTS

- Tap root, rarely has branches. BREAK
- cauline, simple, opposite, decussate, petiolate, extipulate, whole, mucronate apex, unicostate reticulate
- veration.

INFLORESCENCE

- cymose, a flower arranged in axillary pears. HISTORY pedicellate, bractate,
- hermaphrodite, actinomorphic, complete, pink, hypogynous.

CALYX [K]

- 5, polysepalous, glandular, inexperienced, inferior, quinquecuneate.

COROLLA [C]

- five, gamopetalous, corolla tube, corolla throat a hairy tube forming a corona, a contorted aestivate.

ANDROECIUM [A]

- 5, free, epipetalous, exchange to petals, nearly lost, anthers attached to aspects, yellow.

GYNOECIUM [G]

- 2 carpels, bicarpellary, syncarpous, carpel united above within the location of favor and swearing, eggs unfused, nectar glands present, unilocular, marginal to plant.

FRUIT

- A pair of elongated follicles.

Part	disease	Mode of administration
Whole plant, leaf	Diabetes diabetes	Oral intake
Leaf	Diabetes mellitus	Oral intake
Leaf of purple and white flowered	Hypertension, cancer	Oral intake
Whole plant	Throat, stomach	Oral intake
Root	Urogenital infection	Oral intake
Root	gonorrhoea	Oral intake
Root	stomach	Oral intake
Whole plant	Hypertension, cancer	Oral intake

MATERIALS AND METHODS

4.1 Plant Material and Quotation Preparation

Vinca minor L. (periwinkle minor), *Vinca principalis* L. (important periwinkle), *Vinca major* L. Var. *Variegata* 'Louden', and *V. Herbacea* Waldst. And Kit. (herbaceous periwinkle) turned into gathered from the 'Alexandru Borza' Botanical Garden of Cluj-Napoca, Romania, and referenced via Father Marcel. Voucher template for each kind became posted within the Herbarium for 'Babeş-Bolyai' University, Cluj-Napoca, Romania (V. Minor CL 665977, V. Most important CL 668019, V. Huge var. *Variegata* CL 668018, V. *Herbacea* CL 668021).

During flowering (April-May and September), the leaves are fully grown of the old flora were accrued and carefully washed with faucet water and filtered, cut into small pieces (0.5-1 cm), weighed, and located on a percolator. Release of phytoconstituents had been processed as described earlier [14], the use of a chilly retrieval approach in 1: 2 (w: v) solvent to a brand new herba ratio. For 3 days clean herba extracted 70% ethanol (Merck,

Bucharest, Romania), at room temperature. Liquid The costs obtained by means of clear outure as follows (w: v / g: mL): 1: 1.2 (V. Minor), 1: 1.4 (V. Predominant), 1: 1.5 (V. Fundamental var. Variegata), and 1: 2 (V. Herbacea). The final ethanol changed into 30% in all fees obtained.

4.2 Phytochemical Analysis of the Vinca Leaf Extracts

4.2.1 HPLC-DAD approach

All reagents had a purification variety and until in any other case detailed. Everything reagents obtained from Sigma-Aldrich (Merck, Bucharest, Romania).

The chromatographic class and acquisition was performed as described earlier [15], within the Agilent 1200 HPLC machine (Agilent Technologies Inc., Waldbronn, Germany) is ready with a vacuum degasser and a temperature-controlled pattern tray. The quaternary pump controls the flow of the moving phase, and the samples are injected routinely. Chromatographic type became finished inside the Zorbax SB-C18 column (250 mm × 4.6 mm, 5 μm particle size) from Agilent (Agilent Technologies Inc., Santa Clara, CA, USA), placed within the thermostat column, and the detection was achieved with a DAD detector. The injection volume become 8 μL (0.22 μm filtered output), the column temperature returned into set at 30 °C, and the flow fee become 1 mL / min.

The best technique used sooner or later covered multistep gradient elution A system that makes use of 0.1% trifluoroacetic acid in ultrapure water as solvent A and acetonitrile as solvent B. The gradient steps were as follows: 0–2 min isocratic at 8% B, 2–17 min from eight to 30% B, 17–27 min democratic 30% B, 27–37 min from 30% to 85% B, 37–40 min from eighty five% to 95% B, 40–41 min isocratic to ninety five% B, and 41–44 min lower back to 8% B, wherein saved till 44 min. UV-Vis detection of compounds turned into achieved using a DAD detector measuring the whole spectrum at 210–600 nm (2 nm correction), each 2 seconds; The chromatograms were at 242, 260, 280, 320, and 340 nm. The standards used were: 3,4-dihydroxybenzoic acid, chlorogenic acid, 4-hydroxybenzoic acid, caffeic acid, syringic acid, rutin, p-coumaric acid, isoquercitrin, ferulic acid, quercitrin, myricetin, berbamine, Vincamine, jatrorrhizine, quercetin, palmitate, berberine, kaempferol, vinblastine, and galanin. The measuring curve is created the usage of a combination of the above tiers at 35, 53, 70, a hundred and five, one hundred forty, 210, 280 μg / mL, and height area in mixture the usage of Agilent soft. Identification of compounds from analyzed samples made the usage of both chromatographic retention time and comparable UV-Vis look are made from softly integrated spectra of analytical degrees. Chemometric research of spectral features of chromatographic peaks that make contributions to at least 1% of the universe at an altitude of 230 nm, formed as previously described [16]; before to perform PCA analysis, all chromatograms are standardized in the form of min-max.

4.2.3 Color cutting of Phytoconstituents in Vinca Leaf Extracts

To test the viability of all phytoconstituent levels, extracts were purified at a awareness of 100 mg / mL in a 30% ethanol solution. Total phenolic content material (TPC) determined Folin-Ciocalteu reduction dose check [17]: 25 μL consistent with extract mixed with 25 μL of Folin-Ciocalteu reagent and 2 hundred μL of easy water, and infused for five min. Then, 25 μL of Na₂CO₃ answer (stock attention: 10.6 g / a hundred mL) had been delivered and the resulting combination changed into simmered for 60 mins inside the darkish. The absorption is measured at 725 nm earlier than, and after that, an incubation duration of 60 minutes. The corresponding percentages are calculated as described in the literature. Level used for the measuring curve turned into gallic acid (variety 2–40 μg / mL). The total content of flavonoid (TFC) was decided by means of the synthesis of AlCl₃ (method 1) [18]. Therefore, 10 μL of every extract become blended with 50 μL of 2% AlCl₃ answer and 50 μL of 1 M sodium acetate at 140 μL in easy water, ninety six-plate. After brooding for approximately 5 mins, 50 μL of zero.1 mM HCl turned into added under extreme vibration. After 20 min extra, drag measured at 452 nm the usage of Tecan Spark multiplate student. The well-known used for the measuring curve turned into rutin (inside the variety 1.6–50 μg / mL). Everything the above assessments are repeated.

4.3.1. How to distribute Agar-Well

By agar-well diffusion Petri bins containing MH-agar media had been vaccinated with each bacterial strain and left at room temperature for 30 minutes to infuse. After that, 6 mm huge springs have been carved into agar the usage of sterile piped tip. Sources had been there then full of sterile cotton beads. Some beads are loaded with a hundred and fifty μL of each extract. The plate additionally has a car controller with 30% ethanol and appropriate control with ciprofloxacin (CIP, 5 μg / mL listen). After 24 hours incubation at 37 °C, it is constructed the sanctuary across the fountains became measured. Each check changed into carried out six times once more rate calculated (19).

PHARMACOLOGICAL ACTIVITIES

5.1 Antibacterial hobby

Raw extracts from different parts of the plant were tested antibacterial hobby. Excerpt from the leaves is proven very high performance. Antibacterial activity of leaf extraction of the plant turned into tested against the microorganism along with *Pseudomonas aeruginosa* NCIM2036, *Salmonella typhimurium* NCIM2501, *Staphylococcus aureus* NCIM5021 and it turned into discovered that extracts can be used as prophylactic agent inside the remedy of many sicknesses [20].

5.2 Anti-oxidant residences

The energy of an ethanolic anti-oxidant extracted from the roots of styles of *C. Roseus* (rosea) and *alba* (white flower) become obtained via a specific approach a check device similar to Hydroxyl radical-scavenging interest, superoxide radical-scavenging interest, DPPH radical-scavenging and nitric oxide radical inhibition way. The effects acquired proved that ethanolic extract *Periwinkle* root species has been proven satisfactory end result of discarding during the trial a the way to pay attention however *C. Roseus* turned into discovered to be they've extra antioxidant than *C. Alba* [21].

5.3 Anti-helminthic pastime

Infection of helminths is an incurable, contagious disease human beings and farm animals. *Catharanthus roseus* changed into found can be used from conventional instances as an anti-helminthic agent. *C. anti-helminthic* residences of *C. Roseus* she become examined the usage of *Pheretima posthuma* as

check model and Piperazine citrate as a standard reference. An ethanolic awareness of 250 mg / ml changed into found to show large antihelminthic activity [22].

5.4 Wound recovery paintings

Cuts, cuts and fashions of useless area wounds have been gift used to evaluate the wound healing characteristic of *C. Roseus*.

5.4.1 Model wound removal

Animals were anesthetized before and throughout advent of ulcers. Mice had been reduce through reducing wounds as defined by using Morton and Malon [23]. The backs of animals were trimmed with an electric powered clip and the predicted region of the wound to form defined at the again of the animals in methylene blue using a circular stainless-steel stencil. The full thickness of two.5 cm reduce wound (circular region = 300mm²) within the middle a top and depth of 0.2 cm become created close to the signs and symptoms the usage of toothpick forceps, a surgical blade and sharp scissors. The entire wound changed into left open [25].

Animals they may be divided into two organizations of 6 each. Group 1 animals they're treated topically with carboxymethyl cellulose (100 mg / kg / day) as a placebo control. Animals for Group 2 is handled with a topical ethanol extract *C. Roseus* at a dose of a hundred mg / kg / day) till whole epithelization. The degree of wound closure become assessed tracking wound 1, 5 and 15 days after harm using show sheet and permanent marker. Wound recorded places are measured using graph paper. Number of days required for eschar fall with none the remaining green wound furnished a duration of epithelization.

5.4.2 Model wound slicing

Like the models within the above fashions had been anesthetized and on the time of wound formation. The hair at the returned of the animals had been sheared with an electric powered trimmer. Longitudinal paravertebral incision, approximately six inches lengthy product of leather and leather-based strap at the back as described with the aid of Ehrlich and Hunt et al. [25]. After surgical procedure, surgical sutures are implemented to specific skin periods of one centimeter. The wounds remained undressed. Mice are given flower extract (melted internal ingesting water) orally in a dose of a hundred mg kg⁻¹ day⁻¹. The controls have been given with normal saline. Sutures were like that eliminated at the day of the wound eight put up and remedy was he persevered. The ability for fracture of the skin is measured day 10 in the manner described by using Lee [26].

5.4.3 Model of lifeless space wound

Dead cerebral palsy is made by means of placing two natural cotton pellets (10 mg), one on each aspect. Lumbar location inside the ventral region of each mouse. Use By day 10 after harm, granulation tissue builds up the planted cotton pellet turned into carefully eliminated. The wet mass of granulation tissue become referred to. These granulation tissue became dried at 60 ° C for 12 hours, too measured, weighed. On dried tissue add 5 ml 6 N HCl and maintain at a hundred and ten ° C for 24 hours. The neutralized acid hydrolyzate of dry tissue become used hydroxyproline supplementation [27].

5.4.4 Determination of wound recovery pressure

The anesthetic changed into secured to the table, and the line was drawn on each aspects of the wound three mm long from the road. This line changed into caught the usage of one of the forceps in it every stop contradicts the alternative. One of the jaws became is strongly supported, and the opposite turned into linked to a metallic plate of freely suspended weight. The weight changed into such introduced slowly and regularly accelerated weight, pulling without the rims of the wound. As the wound can be opened, weight gain turned into stopped and weights brought was mentioned as a measure of strength violations in grams. Three readings have been recorded with the wound supplied, and the technique was repeated contralateral wound. The analyzing rate of the group was taken as every quantity of breaking pressure. Average value gives breaking energy for a given organization .

5.4.5 Hydroxyproline dosage

Hydroxyproline present in acid hydrolyzate tissue granulation oxidized by using sodium peroxide the front of copper sulfate, whilst combined with para-dimethylaminobezaldehyde, turns into a red shade measured at 540 nm the use of colorimetry. (28)

5.4.5.1 Phytochemical checking out methods

Test for saponins: Boiled 300 mg of 5 ml extract water for two mins. The mixture is cooled and blended vigorously and left for 3 minutes. The foam formation indicates the presence of saponins.

Testing for tannins: In a sodium aliquot extracted chloride to make 2% power. Filtered and included with 1% gelatin answer. Rain indicates presence tannins.

Trial Triterpenes: 300 mg of extract blended with five ml chloroform and heat for 30 minutes. Chloroform The answer is dealt with with a small quantity of focused and properly-combined sulfuric acid. Appearance pink shows the presence of triterpenes.

Alkaloid check: 300 mg of extract extracted 2 M HCl Acidic filtrate changed into combined with amyl alcohol in the chamber temperature, and checked the alcohol layer for the crimson shade indicating the presence of alkaloids.

Flavonoid trying out: The presence of flavonoids became decided using a 1% aluminum chloride solution in methanol, focused HCl, magnesium turnin, and potassium hydroxide answer.

The chromatography of the thin layer of ethanol extracted turned into Medium overall performance together with cell class:

Petroleum ether: ethyl acetate (four: 1 × 1 vol / vol)

Chloroform: methanol (4: 1 × 1 extent / extent)

Chloroform: ethanol (1: 1 × 1 vol / vol)

5.5 Anti-wound properties

Vincamine and Vindoline alkaloids of the plant have shown antiulcer homes. The alkaloid vincamine, that's present in the plant leaves display cerebrovasodilatory and neuroprotective residences feature. The leaves of the plant testify to its anti-ulcer function in opposition to gastrointestinal injuries finished in rats [29].

5.6 Hypotensive Assets

The elimination of plant leaves makes a huge distinction hypotensive. The leaves are recognised to 150 A useful alkaloid amongst different pharmacologically lively combos. Significant antihyperglycemic and hypotensive interest of leaf extracts (hydroalcoholic or dichloromethane-methanol) has been reported in the laboratory animals [30].

5.7 THE WORK OF PREVENTION AND DIABETES

Vinca rosea of flowers and leaves includes ethanolic extracts are much like ordinary medicinal drug Glibenclamide is a hypoglycemic agent Hypoglycemic action is induced as a result the impact of multiplied glucose uptake at the liver [31,32,33]. Because of the usage of glucose in the liver, hypoglycemic interest is over Dichloromethane: methanol extract [1: 1] has hypoglycemic activity on leaves and branches vinca in streptozotocin which makes a mouse diabetic version at a dose of 500mg / kg available obtained orally for 7-15 days. . 48.6 and fifty seven.6% hypoglycemic pastime become additionally determined continuously remedy for a duration of 30 days is supplied complete safety towards the task of STZ (75mg /kg / i.P.). Glycogen synthase, glucose 6- phosphatedehydrogenase, succinate dehydrogenase and malatedehydrogenase pastime of enzymes which depletes the liver of diabetic animals and becomes progressed after remedy with extract at a dose 500mg / kg orally for 7 days. Shows expanded glucose metabolism in mice they're treated with elevated lipid in line with oxidation ranges.

5.8 ESTABLISHMENT LESSONS

Anti-diarrheal homes are examined in wistar mice through ethanolic leaf extracts and castor oil as The diarrhea take a look at has an early treatment. The anti-diarrhea impact turned into proven in dosage a ban based on castor oil made diarrhea [34].

Capacity-based totally regulations Diarrhea resulting from castor oil is at the level of two hundred and 500 mg / kg and prevention of charcoal digestion of the charcoal meal. This information confirms regular use of vinca in treatment and control of diarrhea [35]

5.9 Wound restoration homes

Mice handled at 100 mg / kg / day of Catharanthus roseus The extracted ethanol had a high degree of wound penetration epithelization time could be very low, it's far important accelerated weight reduction and hydroxyproline content of granulation tissue in comparison to controls. Wound reach and increase in electricity of energy as nicely the hydroxyproline content supports the usage of C. Roseus wound recuperation management [36]

5.10 Hypolipidic effect

In the take a look at, an critical antiatherosclerotic feature as suggested by using decreasing serum stages of overall cholesterol, cautioned Triglycerides, LDL-c, VLDLc and aorta histology, liver and kidney juice of the leaves of Catharanthus roseus (Linn.) G. Donn. It can be a result of the antioxidant impact of flavonoid, and possibly, vinpocetine as an current compound inside the juice of the leaves of Catharanthus roseus (Linn.) G. Donn [37].

6. Work to enhance reminiscence

Vinpocetine is said to have various moves that supposedly might be of benefit to Alzheimer's disease (AD). The handiest have a look at investigating this agent in a nicely-described organization of AD sufferers determined no benefit. Metalysis evaluation of previous studies of previously unpublished vinpocetine human beings with dementia finish that they're no longer enough proof to guide its medical use for the duration of this era. Vinpocetine has been properly tolerated at doses of as much as 60 mg / d at the clinic trials of dementia and stroke, and not anything awful is major occasions [38]

6. Conventional Use of Correction

Break / and root / their C roseus drink traditionally used in many extraordinary countries answer. Used for belly cramps, in menorrhagia, as an anti-cancerous within the Philippines. In Medagaskar it's far used as vomitive, purgative, vermifugl, depurative, hemostatic herbs and toothpaste. In India, leave juice is used in beehives and wasp sting. In Africa they may be used for menorrhagia once arthritis. The plant is used for diabetes, excessive blood strain, insomnia and most cancers in Malaysia. The juice. Croseus is used for nondigestion as properly dyspepsia in Mauritius.

Historical decoction / The extract is used for bronchial asthma, flatulence as properly tuberculosis within the Bahamas, an ashes bathtub for infants in Cuba and Jamaica. America uses plant juice as Gargle reduces throat, chest infections as properly laryngitis. West Indies, Philippines and Nigeria use plant in sugar. Boiled plant is likewise used bleeding binding in Hawaii [39].

CONCLUSIONS

C. Roseus can be taken into consideration a wealthy supply of alkaloids and phenols, which comprise a wide variety of organisms. Residences that consist of anticancer, antidiabetic, antioxidant, antimicrobial and antihypertensive sports. Many alkaloids and phenolics have been discovered on this cloth but many computer systems are unknown. As a result, the identification and dissociation of the chemical phytochemicals inside a separate structure parts of C.

Roseus have to be carried. In addition, the viable use of bioactive compounds discovered in this newsletter should be further investigated for you to use nutraceutical as properly pharmaceutical industries.

Compounds determined in this article need to be in addition investigated with a purpose to use nutraceutical as nicely pharmaceutical industries.

REFERENCES

1. Ajaib M, Khan ZUD, Khan N, Wahab M. EEthnobotanical studies on useful shrubs of District Kotli, Azad Jammu & Kashmir, Pakistan. *Pak J Bot.* 2010; 42:1407-1415.
2. Dr. HemamaliniBalaji, Versatile. Therapeutic effects of *Vinca rosea* Linn. *International Journal of Pharmaceutical Science and Health Care.* 2014; 1(4):5976.
3. Erdogrul. Antibacterial activities of some plant extract used in folk medicine. *Pharm. Biol.* 2002; 40:269-273.
4. Sharma Sk. "Medicinal Plants used in Ayurveda". New Delhi: Rashtriya Ayurveda Vidyapeeth, Ministry of Health and Family Welfare, Govt of India (1998): 193.
5. Muthu, C.; Ayyanar, M.; Raja, N.; Ignacimuthu, S. Medicinal plants used by traditional healers in Kancheepuram district of Tamil Nadu, India. *J. Ethnobiol. Ethnomed.* 2006, 2, 43.
6. Khan, M.H.; Yadava, P. Antidiabetic plants used in Thoubal district of Manipur, Northeast India. *Indian J.Tradit. Know.* 2010, 9, 510–514.
7. Swanston-Flatt, S.K.; Day, C.; Flatt, P.R.; Gould, B.J.; Bailey, C. Glycaemic effects of traditional European plant treatments for diabetes. Studies in normal and streptozotocin diabetic mice. *Diabetes Res.* 1989, 10, 69–73.
8. Holdsworth, D.K. Traditional medicinal plants of rarotonga, cook islands part I. *Int. J. Crude Drug Res.* 1990,28, 209–218.
9. Ochwang'i, D.O.; Kimwele, C.N.; Oduma, J.A.; Gathumbi, P.K.; Mbaria, J.M.; Kiama, S.G. Medicinal plants used in treatment and management of cancer in Kakamega County, Kenya. *J. Ethnopharmacol.* 2014, 151,1040–1055.
10. Fernandes, L.; Van Rensburg, C.; Hoosen, A.; Steenkamp, V. In vitro activity of medicinal plants of the Venda region, South Africa, against *Trichomonasvaginalis*. *S. Afr. J. Epidemiol. Infect.* 2008, 23, 26–28.
11. Semenya, S.; Potgieter, M. *Catharanthus roseus* (L.) G. Don.: Extraordinary bapedi medicinal herb forgonorhoea. *J. Med. Plant. Res.* 2013, 7, 1434–1438.
12. Chigora, P.; Masocha, R.; Mutenheri, F. The role of indigenous medicinal knowledge (IMK) in the treatment of ailments in rural Zimbabwe: The case of Mutirikwi communal lands. *J. Sustain. Dev. Afr.* 2007, 9, 26–43.
13. Vo, V.C. Dictionary of Vietnamese medicinal plants, Medical Publishing House, Ha Noi. *Am. J. Plant Sci.*2012, 4, 210–215.
14. Pârvu, M.; Vlase, L.; Fodorpataki, L.; Pârvu, O.; Bartha, C.; Ros, ca-Casian, O.; Barbu-Tudoran, L.;
15. Pârvu, A.E. Chemical composition of celandine (*Chelidoniummajus* L.) extract and its effects on
16. *Botrytis tulipae* (Lib.) lind fungus and the tulip. *Not. Bot.Hort. Agrobot.* 2013, 41, 414–426. [CrossRef]
17. Andreicut, A.-D.; Pârvu, A.E.; Mot, A.C.; Pârvu, M.; Fischer Fodor, E.; Cătoi, A.F.; Feldrihan, V.; Cegan, M.; Irimie, A. Phytochemical analysis of anti-inflammatory and antioxidant effects of *Mahoniaaquifolium* flower and fruit extracts. *Oxid. Med. Cell Longev.*2018, 2018. [CrossRef]
18. Farcas., A.D.; Mot., A.C.; Zăgrean-Tuza, C.; Toma, V.; Cimpoiu, C.; Hosu, A.; Pârvu, M.; Roman, I.; Silaghi-Dumitrescu, R. Chemo-mapping and biochemical modulatory and antioxidant/prooxidant effect of *Galiumverum* extract during acute restraint and dark stress in female rats. *PLoS ONE* 2018, 13. [CrossRef] [PubMed]
19. Blainski, A.; Lopes, G.C.; de Mello, J.C.P. Application and analysis of the FolinCiocâlțeu method for the determination of the 10. Fernandes, L.; Van Rensburg, C.; Hoosen, A.; Steenkamp, V. In vitro activity of medicinal plants of the total phenolic content from *Limoniumbrasiliense* L. *Molecules* 2013, 18, 6852–6865. [CrossRef] [PubMed]
20. P_ekal, A.; Pyrzynska, K. Evaluation of aluminiumcomplexation reaction for flavonoid content assay. *Food Anal. Met.* 2014, 7,1776–1782. [CrossRef]
21. Mot., A.C.; Bischin, C.; Mures, an, B.; Pârvu, M.; Damian, G.; Vlase, L.; Silaghi-Dumitrescu, R. Antioxidant activity evaluation by physiologically relevant assays based on haemoglobin peroxidase activity and cytochrome c-induced oxidation of liposomes. *Nat.Prod. Res.* 2016, 30, 1315–1319. [CrossRef]
22. PrajaktaPatil J, Jai S. Ghosh. Antimicrobial Activity of *Catharanthus roseus* – A Detailed Study. *British Journal of Pharmacology and Toxicology.* 2010; 1(1):40-44.
23. Alba Bhutkar MA, Bhise SB. Comparative Studies on Antioxidant Properties of *Catharanthus Rosea* and *Catharanthus*. *International Journal of Pharmaceutical Techniques.* 2011; 3(3):1551-1556.
24. Swati Agarwal, Simi Jacob, Nikkita Chettri, Saloni Bisoyi, Ayesha Tazeen, Vedamurthy AB etal.Evaluation of In-vitro Anthelmintic Activity of *Catharanthus roseus* Extract. *International Journal of Pharmaceutical Sciences and Drug Research.* 2011;3(3):211-213.
25. Morton JJP, Malone MH: Evaluation of vulnerary activity by an open wound procedure in rats. *Arch Int Pharmacodyn* 1972,196:117-126.
26. Diwan PV, Tilloo LD, Kulkarni DR: Influence of *Tridax procumbens* on wound healing. *Ind J Med Res* 1982, 75:460-464
27. Ehrlich HP, Hunt TK: Effect of cortisone and vitamin A on wound healing. *Ann Surg* 1968, 167:324 328.
28. Lee KH: Studies on mechanism of action of salicylates II. Retardation of wound healing by aspirin. *J Pharm Sci* 1968,57:1042-1043.
29. Neuman RE, Logan MA: The determination of hydroxyproline. *J Biol Chem* 1950, 184(1):299-306.
30. Kumar R, Katoch SS, Sharma S: β -Adrenoceptor agonist treatment reverses denervation atrophy with augmentation of collagen proliferation in denervated mice gastrocnemius muscle. *Indian J Exp Biol* 2006, 44(5):371-376.
31. Babulova A, Machova J, Nosalova V. Protective action of vinpocetine against experimentally induced gastric damage in rats. *Arzneimittel forschung.* 2003; 43:981-985.
32. Pillay PP, Nair CPM, Santi Kumari TN. *Lochnera rosea* as a potential source of hypotensive and other remedies. *Bulletin of Research Institute of the University of Kerala.* 1959; 1:51-54.

33. Chattopadhyay RR., et al. "Hypoglycemic and antihyperglycemic effect of leaves of *Vinca rosea* Linn". Indian Journal of Physiology and Pharmacology 35.3 (1991): 145-151.
34. Singh SN., et al. "Effect of an antidiabetic extract of *Catharanthus roseus* on enzyme activities in streptozotocine induced diabetic rats". Journal of Ethnopharmacology 76.3 (2001): 269-277
35. Ghosh S and Suryawanshi SA. "Effect of Alloxan *Vinca rosea* extracts in treatment of alloxan diabetes in male albino rats". Indian Journal of Experimental Biology 39.8 (2001): 748-759.
36. Mithun Singh Rajput, Veena Nair, Akansha Chauhan. Evaluation of Antidiarrheal Activity of Aerial Parts of *Vinca major* in Experimental Animals. Middle-East Journal of Scientific Research. 2011, 7 (5): 784-788.
37. Hassan KA., et al. "In vivo anti diarrheal activity of the ethanolic leaf extract of *Catharanthus roseus* Linn. (Apocyanaceae) in Wistar rats". African Journal of Pharmacy and Pharmacology 5.15 (2011): 1797- 1800.
38. Nayak BS, Anderson M, Pereira LMP. Evaluation of wound-healing potential of *Catharanthus roseus* leaf extract in rats. Fitoterapia. 2007; 78:540-544.
39. Yogesh Patel et al. Evaluation of hypolipidemic activity of leaf juice of *Catharanthus roseus* (Linn.). Acta Poloniae Pharmaceutica - Drug Research. 2011;68(6):927-935.
40. Sekar P. Vedic clues to memory enhancer. The Hindu. 1996.
41. Sain M, Sharma V. *Catharanthus roseus* (An anti-cancerous drug yielding plant) - A Review of Potential Therapeutic Properties. Int. J. Pure App. Biosci. 2013; 1: 139-142.