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A Review on Morphological, Phytochemical, Pharmacological aspect of Tabernaemontana divaricata Linn

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Abstract: *The evergreen, attractive, and extremely beneficial ethnomedical plant Tabernaemontana divaricata Linn. is used for a variety of traditional medical applications all throughout the world. The plant, which is a member of the Apocynaceae family.The leaves have a glossy, deep green colour. Alkaloids such as conophylline, isovoacristine, α-amyrin acetate, β-amyrin acetate, and others are abundant in this plant.Numerous beneficial pharmacological properties, including anti-inflammatory, anticancer, analgesic, antioxidant, anti-diabetic, anti-convulsant, antibacterial, and antiinfertility properties, are attributed to it. Abdominal tumours, epilepsy, eye infections, fever, headache, inflammation, leprosy, asthma, diarrhoea, paralysis, rheumatic pain, ulceration, and vomiting are among the conditions that this plant is also used to cure. Thus, the review paper provides a brief description of this medicinal plant's morphological characteristics, phytochemical makeup and pharmacological properties.*

Keywords: Tabernaemontana divaricata, Morphology, Phytochemical, Pharmacology

I. INTRODUCTION

There are many plants in nature that have therapeutic uses. Numerous types of traditionally used medicinal plants are found all over the world, and these natural sources yield an outstanding amount of medications[1]. The medicinal plants used in Ayurvedic, homoeopathic, and Siddha medicine systems are important in the treatment of physiological diseases in humans[2].The earth's natural phytodiversity is a rich source of therapeutic plants, and almost 80% of the world's population relies on plant-based medicines as part of their traditional medical care[3]. Due to their minimal or nonexistent negative effects on humans, medicinal plants are used by millions of people worldwide for primary healthcare. Each of these therapeutic plants contains a vast number of phytochemical components[4].The existence of it is quite simple to comprehend the plant's therapeutic significance based on the presence of phytochemical elements[5].Phytochemicals are extracted from various plant parts, including flowers, leaves, stems, fruits, and roots, to combat medical ailments. Primary metabolites, which include amino acids, proteins, carbohydrates, and chlorophyll, and secondary metabolites, which include phenols, alkaloids, flavonoids, terpenoids, tannins, saponins, and glycosides, are the two categories of phytochemicals found in this plant[2]. Tabernaemontana divaricata is both an evergreen shrub and an ornamental plant[1]. It is a member of the Apocynaceae family. Crepe jasmine is its common name.[5] This plant is very attractive because of its silvery grey bark, milky latex, shiny deep greePlants which are commonly referred to as “milkweed” due to their latex content leaves and white color[7].The plant parts are used in curing various physiological disorders of human being like epilepsy, abdominal tumors, eye infections, fractures, fever, headache,inflammation etc[1].

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Fig No.1:-Tabernaemontana divaricate

II. PLANT PROFILE

2.1Monograph

Language	Name
English	Crepe Jasmine,Pinwheel Flower
Sanskrit	Nandivarksha
Hindi	Chandani,Tagar
Marathi	Ananta,Tagar
Bangladesh	Dudhful
Assamese	Kathanda

Table No.1:-Monograph of T. divaricate[1]

2.2 Taxonomical Position: -

Kingdom	Plantae
Phyllum	Tracheophyta
Class	Magnoliopsida
Order	Gentianales
Family	Apocynaceae
Genus	Tabernaemontana
Species	divaricata
Botanical Name	Tabernaemontana divaricate (L.)

Table No.2:-Taxonomical Position of T. divaricate[1]

III. PLANT DESCRIPTION

3.1 Geographical Source: - .The plant is found throughout Asia, Australia, Japan's mangrove forests, and India. It generally occurs in upper Gangetic plain, Garhwal, Khasia Hills, Assam, Myanmar, Bangladesh,Vishakhapatnam, and West Bengal. It can grow as a garden plant, and also found on roadsides, lawns, and human settled areas[5].

3.2 Collection of plant: The leaves of T. divaricata plant were collected from within the Bharathy Darshan University campus, Tiruchirappalli, Tamilnadu, India. The plant was identified by the Rapinat Herbarium and Centre for Molecular Systematics, St.Joseph's College, Tiruchirappalli, India.

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3.3 Morphology :-

The pinwheel flower also called as crape jasmine sounds absolutely stunning with its waxy white flowers and glossy dark green leaves[8].

Habitat:-

Grown as brushwood,sparse forests,house/glasshouse plant.[9].

Leaves :-

These plants often exhibit leaves arranged in whorls of three, with elliptic to lanceolate or obovate shapes, bright green on the upper side and pale green on the underside, along with an acute or acuminate tip and a slender, tapering base.[8] .

a)Dorsal leaf b)Ventral leaf

Fig No.2:- a) Dorsal leaf and b)Ventral leaf

Stem :-

Woody, smooth, hairless, dichotomously branched, dark brownish, hard, erect, branching, solid, tuber-like, thick, with milky latex and silvery grey bark, the plant's stem is multi-trunked or clumping[1].

Fig No.3:-Stem

Flower :-

The flowers of Tabernaemontana divaricata. The flowers showcase distinct carpels, each with a long style and an oblong stigma, along with numerous ovules. The calyx consists of five imbricate lobes forming a bell shape, while the corolla takes on a salver-shaped structure with a dilated tube below the top and five ovate lobes.The bisexual flowers typically have diameter of 6-12 cm, with slender, pubescent pedicels measuring around 1-1.5 cm in length. The jointed apex and hairy underside are distinctive features of these flowers[8].

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Fig. No.4:- Flowers

Calyx

the calyx of Tabernaemontana divaricata typically consists of five lobes, and it's stellate or star-shaped, covered with glandular hairs on the outside. This characteristic helps distinguish it within its botanical features.

Corolla

Tabernaemontana divaricata indeed boasts a striking corolla that can be quite eyecatching. The base of the corolla comes in various colors like yellow, white, orange, or purple, and its overall structure is typically bell-shaped or campanulate, contributing to its allure and appeal as an ornamental plant[8].

Fruit :-

Tabernaemontana divaricata's ovary develops into a capsule, a dry, dehiscent fruit that bursts open to reveal a large number of tiny seeds. Rare but pod-like, ribbed, curved, dry or hard, with two follicles, the fruits are green on the exterior and orange-red inside, and they narrow into a thin, curled beak. Numerous plants share this capsule shape and seed dispersal method, which aids in Tabernaemontana divaricata's growth and dissemination[7].

Seeds:

The plant has many seeds, dull brown in colour, minutely pitted, and irregular, enclosed in a red pulpy aril.

Root:-

The roots of Tabernaemontana divaricata are typically tuberous. The root of the plant is tap root system. The root is silvery brownish, hard, branched with no odour and taste. These tuberous roots play a role in the plant's nutrient storage and absorption, aiding its growth and development[8].

Fig No.5:- Root

3.4 Botanical Description:- Tabernaemontana divaricata is an evergreen medicinal shrub and moderately fast-growing .The plant is a glabrous, 1.5-2.5m in height with silvery grey bark, wrinkled and milky latex exudes when wounded, and has snow white colored fragrant flowers. The leaves are shiny deep green in color[10] .

3.5 Medical uses:-Jasmine is widely used as a medicinal herb in the tropics and the plant used as gastro-intestinal and skin affections.

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The roots are astringent .

A decoction is used in the treatment of diarrhoea and abdominal complaints.

The roots, leaves, and flowers are all used in the treatment of snake and scorpion poisoning. An infusion is applied as a remedy for jungle fever.

The roots are used in modern medicine to treat hypertension, headache and scabies.[9] .

IV. PHYTOCHEMICAL COMPONENT

The thoroughness of the phytochemical investigation of Tabernaemontana divaricata is intriguing. Proteins, carbohydrates, cardiac glycosides, alkaloids, terpenoids, steroids, flavonoids, phenylpropanoids, phenolic acids, saponins, and different enzymes are only a few of the bioactive substances that the plant exhibits. In particular, the ethanolic extracts show a high concentration of flavonoids and a concentration of proteins. Significant amounts of phenols (calculated at 47.1 mg GAE/g), total flavonoids (19.6 mg QE/g), and total protein (18 mg/g) are present in the leaves. The flower also exhibits a notable amount of total phenols (6.2 mg GAE/g), total protein (2 mg/g), and flavonoids (15.4 mg QE/g). These results highlight the plant's abundance of bioactive substances, which may be a factor in its pharmacological characteristics[7].

S.no.	Chemical class	Leaves	Flowers	Fruits	Stem	Roots	Aerial parts
1	Alkaloids	+	+	-	++	+	+
2	Carbohydrates	-	+	-	++	-	-
3	Glycosides	+	+	-	++	+	-
4	Flavanoids	+	+	-	++	+	-
5	Amino Acids	+	+	-	++	-	-
6	Tannins	+	+	-	-	-	-
7	Steroids	+	+	-	+	-	+
8	Saponins	+	-	-	-	-	-
9	Proteins	+	-	-	+	-	+
10	Fixed oils	+	-	-	-	-	-
11	Resins	+	-	-	-	-	-
12	Reducing sugar	_	-	-	-	-	-

Slightly present ++ Present + Absent –

Table No.3 Presence of various phytoconstituents present in different parts of T. divaricata plant [8]

Total Phenolic content :-

ToThe Folin-Ciocalteu method was used to calculate the amount of total phenolics in the extracts. Samples (200 uL) were put in test tubes. 0.8 mL of sodium carbonate (7.5%) and 1 mL of Folin-Ciocalteu reagent were added. After mixing the tubes, they were left for half an hour. Absorption was measured at 765 nm. It was discovered that the total phenol was 36 ± 1.0 mg of GAE/gm extract.

Total Flavonoid Content :-

A modified colorimetric approach was used to determine the concentration of total flavonoids 75 uL of a 5% $NaNO_2$ solution and 1 mL of distilled water were combined with the plant extract (1.0 mL). After five minutes, 75 ul of a 10% $AlCl_{2\cdot H2O}$ solution was added. 0.5 mL of 1M sodium hydroxide was added five minutes later. The solution was combined and then let to stand for fifteen minutes. Absorption was measured at 510 nm. It was discovered that the total flavonoid concentrations were 10.67 ± 0.577 mg of QEE/gm extract.

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Total protein content :-

The Lowry et al. approach was used to determine the total protein. 0.1 mL of plant extract was added to each standard concentration, and the volume was then raised to 1 mL using distilled water. Each test tube received 5 mL of the alkaline copper sulphate reagent, which was then allowed to stand for 10 minutes at room temperature. The Folin Ciocalteu reagent (0.5 mL) was then added, and the mixture was incubated for 20 minutes at room temperature. Absorption was measured at 660 nm. A protein content of
9.73 ± 0.230 mg/ml was determined[11][7].

Qualitative tests of plant extracts of Tabernaemontana divaricata were performed to detect the presence of various phytochemicals including Alkaloids, Tannins, Reducing sugars, Saponins, Gums, Steroids, Triterpenoids, Flavonoids and Proteins[3] .

Test for alkaloids :-

2 mL solution of the extract and 0.2 mL of dilute hydrochloric acid were taken in a test tube. Then 1 mL of Mayer's reagent was added. Yellow colour precipitate was not formed and that was indicated as the absence of alkaloids.

Tests for tannins :-

5 mL solution of the extract was taken in a test tube. Then 1 mL of 5% Ferric chloride solution was added. Greenish black precipitate was formed and indicated the presence of tannins.

Tests for reducing sugar :-

0.5 mL of aqueous extract of the plant material was taken in a test tube. 5 mL of Benedict's solution was added to the test tube, boiled for 5 min and allowed to cool . a red colour precipitate of cuprous oxide was formed in the presence of a reducing sugar .

Test for saponins :-

1 ml solution of the extract was diluted with distilled water to 20ml and shaken in a graduated cylinder for 15 min 1 cm layer of foam indicates the presence of saponins.

Test for gums :-

5 mL solution of the extract was taken and then Molish reagent and sulphuric acid were added. Red violet ring produced at the junction of 2 liquids indicates the presence of gums.

Test for steroids :-

1 mL solution of chloroform extract was taken and then added 1mL sulphuric acid. Having a red colour indicates the presence of steroid.

Test for flavonoids :-

Added a few drops of concentrated hydrochloric acid were added to a small amount of an alcoholic extract of the plant material. Immediate development of a red color indicates the presence of flavonoids[6].

Alkaloids of T. divaricata :- 12 Hydroxy akuammicine :-

. One of the main alkaloids of T. divaricata is 12-hydroxy akuammicine. One of the researchers gave an intravenous dose. At a dosage of 15-20 mg/kg/day for 10-20 days, the IP injection of 12-hydroxy akuammicine in mice and rats prevented the development of ascites and alveolar lymphoma[12].

Dregamine :-

Dregamine can be found in the parts of the plant of T. divaricata such as leaves and stems, along with bark and roots. It has been demonstrated that dregamine has convulsive and respiration-related stimulating effects. It causes muscle pain in both in vivo and in vitro studies, apparently not very different from the activity of ibogaine. Dregamine has been used for the treatment of conditions such as muscular-related and nervous asthenia and respiratory depression .

Apparicine :-

According to in vitro research, apparicine can inhibit and stop the polio virus's activity at a specific concentration.Additionally, at varying doses, this alkaloid shown antibacterial action against Salmonella, Pseudomonas, Escherichia, Shigella, Proteus, Staphylococcus, and Corynebacterium in an in vitro research[12].

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Catharanthine:-

The study by Ehrlich of ascites tumour cells, where it is easily detected by a biological model for the investigation of tumour cells,catharanthine showed the aminoisobutyric acid kind of effects, an amino acid transporter in tumour cells. This revelation inferred that catharanthine have anti-tumour properties.

Conophylline :-

Conophylline which comes from T. divaricate happens to be a vinca alkaloid. It has been demonstrated in experiments that it induces the differentiation of pancreatic precursor cells.Conophylline discourages and dissuades the development of cystic structures. Furthermore, they increased the number of insulin-positive cells in the rat pancreatic rudiment of organ culture.Conophylline has also been demonstrated to help increase insulin production in rat pancreatic carcinoma cells. Conophylline has been used as a health food lately and helping patients avoid obesity and diabetes. Some studies suggest it may lower blood glucose levels. Conophylline also happens to be a new anti-tumour alkaloid[13] .

Ibogamine:-

Ibogamine is an indole alkaloid that is present in the bark, roots, leaves, and stems of the T. divaricata plant. It has been proposed in the study that it can be utilised to reduce some of the animals monosynaptic knee-jerk responses. Remarkably, neither postsynaptic reflex arcs nor neuromuscular transmission were impacted by the mechanism of action.It's also intriguing to notice that it might have had an impact by blocking nicotinic receptors at the neuromuscular system's junction[12][13].

Classification of alkaloid on the basis of plant parts and class of alkaloids ;-

Class of alkaloids :-Ibogan

Parts of plant :- Whole plant

Alkaloid :-

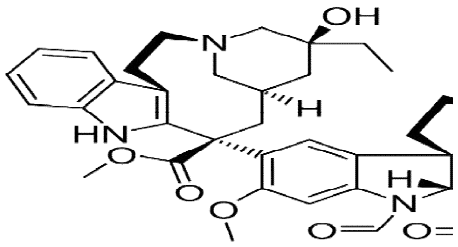
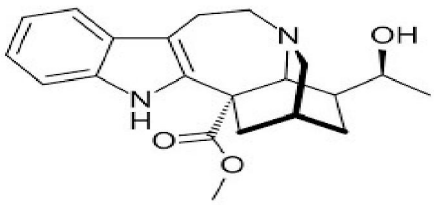
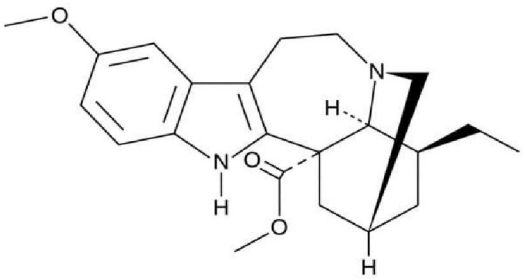
Name of alkaloid	Structure of alkaloid
Vocristine	
Heyneanine	
Voacangine hydroxyindolenine	

Table No. 4 Name and Structure of class of ibogan alkaloids of whole plant

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Class of alkaloids :- Ibogan
Parts of plant :-flowers
Alkaloids :-

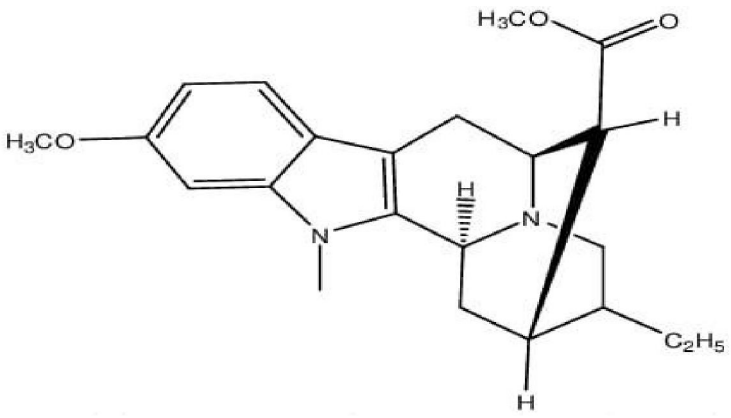
Name of alkaloid	Structure of alkaloids
11 Methoxy-N-methyldihydropericyclivine	

Table No.5 Name and Structure of class of ibogan alkaloids in fiowers.

Class of alkaloids :-Bis-indole
Parts of plants :-Stem
Alkaloid :-

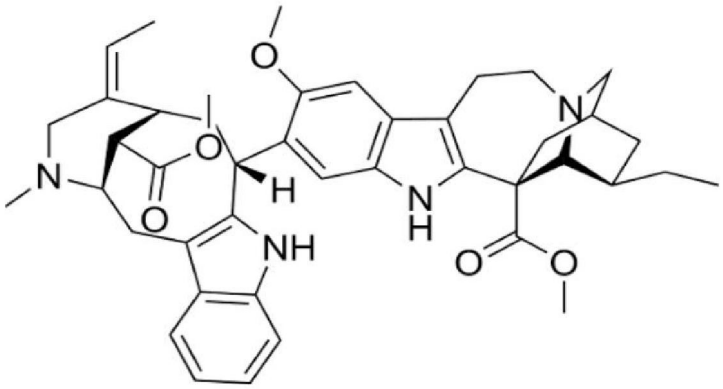
Name of alkaloid	Structure of alkaloid
Voacamine	

Table No.6 Name and Structure of class of bis-indole alkaloids in stem.

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Class of alkaloids :- Bis-indole
Part of plant :- Leaves
Alkaloid :-

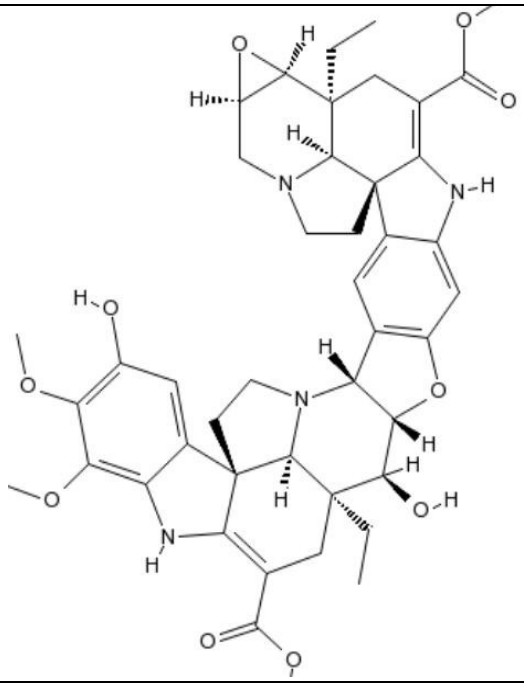
Name of alkaloid	Structure
Conophylline	

Table No.7 Name and Structure of class of bis-indole alkaloid in leaves

Non-alkaloids of T.divaricata :-
T. divaricata has also yielded non-alkaloidal components, including hydrocarbons, steroids, terpenoids, and enzymes. Formally, terpenoid-indole alkaloids are made up of a C10 unit of terpenoid origin (secologanin) and a unit of tryptamine, which is produced by the enzyme tryptophan decarboxylase (TDC) decarboxylating tryptophan. The function of the enzymes that control the manufacture and metabolism of terpenoids in T. divaricata has been shown in a number of investigations. The five known enzymes— isopentenyl diphosphate isomerase, prenyl transferase, squalene synthetase, qualene 2,3 oxide cycloartenol cyclase, and squalene 2,3-oxide cyclase—were initially identified in T. divaricata cell suspension culture. In regulating the flow of carbon into the cytosolic microsomal pathway of terpenoid synthesis, these enzymes play a crucial regulatory
role[12][14].

V. MATERIAL AND METHOD

5.1 Material :- Fresh and mature leaves of T. divericata were collected.The leaves were shade-dried and powdered.The powder was sieved and stored in airtight container.

5.2 Preparation of Ethanolic Extract:-Anbukkarasi M.,et.al used a Soxhlet device, 30 grammes of the powder were extracted with 300 millilitres of 95% ethanol. The solvent was dried in a vacuum after being evaporated at 55–60°C with reduced pressure. Vacuum distillation was used to filter and concentrate the residue to a dry bulk. For additional analysis, this dried ethanolic extract of T. divaricata was utilised [15].

5.3 Preparation Of Methanolic Extract : Rahman M.,et.al after soaking in enough methanol for a week, the 200 g of crushed leaves were filtered through a cotton plug and Whitman filter paper number 1. The semisolid was produced by vacuumevaporating the solvent at room temperature. After that, the extract was kept in a refrigerator until it was needed again.

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5.4 Preparation Of Culture:-According to Wankhede S.,et.al one standard strain of Candida albicans ATCC 90028was obtained and maintained on YPD agar slant at 4^0C.A single colony from a YPD agar plate (yeast extract 1%, peptone 2%, dextrose 2%, and agar 2%) was inoculated into 50 ml of YPD broth in a 250 ml conical flask to activate the culture. An orbital shaking incubator was used to incubate the flask for 24 hours at 30°C and 100 rpm. After centrifuging the cells at 2000 × g, they were cleaned three times using 0.1 M phosphate buffer saline (PBS), which has a pH of 7.4. Hemocytometer counts were utilised to assess the cell density; cells were then suspended in PBS and used as the inoculum for additional research.

VI. PHARMACOLOGICAL ACTIVITIES

6.1 Antioxidant Activity :-

Concentration-dependent scavenging of hydroxyl, superoxide, and DPPH free radicals, reducing power, and ferrous ion chelation are examples of the phytoconstituents with antioxidant potential found in the ethanolic extract of T. divaricata leaves.With its strong in-vitro antioxidant activity, the ethanolic extract of T. divaricata leaves may one day be used as a treatment for pathological conditions brought on by oxidative stress[15].Mandal and Mukherji showed in another study that the plant is one of the greatest scavenging systems to combat the effects of air pollution. Their result concluded that the plant Tabernaemontana divaricata have a high range of activity of antioxidant agents such as CAT, SOD, GSH, phenolic peroxidase and ascorbate peroxidase[16].

6.2 Anti-analgesic Activity :-

The roots of Tabernaemontana divaricata have been used in traditional medicine to report their analgesic qualities. The Henriques et al. trial confirms the anti-nociceptive effect. They demonstrated that mice given 150 mg/kg of Tabernaemontana divaricata orally or intraperitoneally were placed on a heated plate (50–55°C) 30 minutes beforehand. The outcome then revealed noticeably faster reaction times to the heat stimulation compared to the control, which was not treated with plant extracts.
However, this mechanism's analgesic efficacy has not been confirmed[1].

6.3 Anti-inflammatory Activity :-

The anti-inflammatory effect was showed in caragennin-induced paw edema of rat.Jain et al. discovered that the leaf extract of Tabernaemontana diversicicata exhibited antiinflammatory properties in male albino mice. The hexane fraction, which is rich in flavonoid chemicals, exhibited strong anti-inflammatory properties. Additionally, this percentage exhibited greater activity compared to the positive medication indomethacin[7].

6.4 Anti-microbial Activity :-

Syphilis, leprosy, gonorrhoea, diarrhoea, and malaria are just a few of the infectious disorders that Tabernaemontana divaricata has been shown to have an antimicrobial effect against. According to an in vitro investigation, an alkaloid can stop the Polio III virus from working at a concentration of 250 µg/ml of apparicine. Apparicine also demonstrated antibacterial action against Salmonella, Shigella, Pseudomonas, Escherichia, Proteus, Staphylococcus, and Corynebacterium at a concentration of 1.2 percent in an in vitro investigation. Additionally, in an in vitro research, approxicine functions as an opioid agonist to opioid receptors. Voacamine exhibits strong antibacterial effect against Gram-positive bacteria including Bacillus subtilis and Staphylococcus aureus, according to another trial. Additionally, it exhibits moderate efficacy against Gram-negative bacteria, including Pseudomonas aeruginosa and Escherichia coli[1]. T. divaricata extracts work as antibiotics voacamine type and 3hydroxyiboga are examples of monoterpenoid indole alkaloids that are physiologically activated and act as antimicrobial agents, inhibiting the growth of bacteria, parasites, and fungi[16].

6.5 Gastro-protective Effect:-

In rats with chemically induced gastric ulceration, the methanolic extract of T. divaricata (L.) flowers shows antioxidant activity and a gastroprotective effect by either increasing the synthesis of the gastric mucosa or avoiding its

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depletion by aggressive agents. A small number of aspidospermatan, corynanthean, ibogan, and plumeran subtypes of indole alkaloids are likely present in the flowers, according to the mass spectral analysis.In the present study it was concluded Tabernaemontana divaricata flower methanolic extract possesses ulcer preventive properties that means the plant had significant gastro-protective effect at a dose of 500 mg/kg[18] .

6.6 Antifungal Activity:-

The leaf's ethyl acetate extract showed a minimum inhibitory concentration (MIC) of 1 mg/ml against C. albicans 90028 growth. Ethyl acetate at a concentration of 8 mg/ml was sufficient to destroy every cell in this strain. Methanol, petroleum ether, and distilled water extracts all suppressed growth in strain 90028 at concentrations of 2 mg/ml; however, they lacked fungicidal action against Candida albicans at concentrations of up to 16 mg/ml. Sequential distilled water extract needed concentrations of 4 mg/ml to stop C. albicans 90028 from growing. At 16 mg/ml, candidatecidal action was visible in the T. divaricata plant's sequential distilled water extract[19].

6.7 Anti-cancer Activity:-

The anticancer properties of a hydroalcoholic decoction of the plant's petals were examined. The extract was made using the Soxhlet extraction method. Here, hydroalcohol and petroleum ether were employed as solvents. The experiment was carried out in the in vitro investigation against the human cancer cell line (HeLa). The MTT assay was also used to examine the suppression of cell growth. The flowers of Tabernaemontana divaricata exhibited a moderate level of anticancer activity in the hydroalcoholic decoction, with an IC50 value over 100 µg/ml. To elucidate the plan's anticancer activity, more research is required [20] .

6.8 Antidiabetic Activity:-

The goal of this work was to test the methanolic extract of Tabernaemontana divaricata leaves anti-diabetic properties using a diabetic mouse model caused by alloxan. Variant dosages, such as 300 and 400 mg/kg body weight, were administered intraperitoneally, and blood glucose levels were assessed at intervals of 0, 2, 6, 12, and 16. The antihyperglycemic efficacy of the extract was compared with that of the common medication metformin. At the 12-hour mark of the therapy, the 400 mg/kg extract reduced the maximal blood glucose level from 14.19±0.47 to 6.86±0.41 mmol/L. This extract's LC50 value was 27.87µg/ml. Therefore, in comparison to conventional medications, the current findings showed that Tabernaemontana divaricata leaves had potential antidiabetic properties[21].

6.9 Toxicity Assessment:-

Analysis of Toxicity Knowing the plant's toxicological evaluation is crucial because Tabernaemontana divaricata has conducted a significant number of pharmacological actions. According to Henriques and colleagues' study of mice, the plant's toxicity was assessed using the behaviour screening test after being administered 150–200 mg/kg body weight of alcoholic or aqueous extracts of the plant sample. According to this test's findings, the data from control animals showed no harm at these dosages. Melo and colleagues, however, reported that the plant main alkaloids, voacristine had dosedependent cytostatic and cytotoxic effects on yeast strains.There have only been a few investigations conducted on Tabernaemontana divaricata's toxicity testing. Determining the negative toxicity consequences and carrying out additional research on the plant's toxicity are crucial[1].

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Name of author	Name of drug	Plant part	Activity	Extract/Compound	Methods/ Species	Discussion
Anbukkarasi M.et.al	Tabernaemontana divaricata	Leaves	Antioxident	Ethanolic extract,Soxhlet app.	DPPH method-in vivo, superoxide anion radial scavenging, Hydrogen peroxide free radical ,GCMS analysis	In the current investigation, an ethanolic extract of T. divaricata leaves was screened to detect phytochemical constituents and putative antioxidant components.
Khan M,.et.al	Tabernaemontana divaricata	Flower	Gastroprotective	Methanolic Extract, Chloroform ,diethyl ether, methanol, phenolphthalein, Soxhlet app. Aspirin, Ethanol	Acute ethanol induced gastric ulcer, Aspirin induced gastric mucosal damage. HPLC, GC-MS analysis.	In rats with chemicaly induced gastric ulceration, the methanolic extract of T. divaricata (L.) R.flowers shows antioxidant activity and a gastroprotective effect by either increasing the synthesis of the gastric mucosa or avoiding its depletion by aggressive agents.

Table No.8 Summary of pharmacological activities.

VII. CONCLUSION

Tabernaemontana divaricata Linn. has enormous potential for morphological, phytochemical, nutritional, and notable therapeutic characteristics, according to the current review article. It is possible to conclude from this review article that the plant has been utilised globally as a significant remedy for a number of physiological conditions. The review also mentioned Tabernaemontana divaricata significant biological or biochemical characteristics.Many primary and secondary metabolites are present in the different parts of Tabernaemontana divaricate. The review of chemical analysis reveals that alkaloids and non-alkaloids present in the extract of parts of Tabernaemontana divaricata which can be applicable in various research applications.It can conclude that there is an significant potential for further research on toxicology, anticancer, anticholinestarase,and antihypertensive.

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