



INTERNATIONAL JOURNAL  
OF  
PHYTOPHARMACY RESEARCH  
www.phytopharmacyresearch.com

## BAUHINIA VARIEGATA LINN: A REVIEW OF ITS ETHNOBOTANY, PHYTOCHEMICAL AND PHARMACOLOGICAL PROFILE

**Kishu Tripathi, Rahul Kumar, Kuldip Kumar, Vaishnavee Gupta, Amit Kumar, Triveni**

Smt. Vidyawati College of Pharmacy, Jhansi, UP - 284121.

### ABSTRACT

*Bauhinia variegata* Linn (Kachnar) is a medium size popular ornamental tree belonging to family *Caesalpiniaceae* (Pea family). The various part of tree like leaves, flowers, flower buds, stem bark, stem seeds and roots are popular in various medicine systems like ayurveda, unani, homeopathy in India for the cure of variety of diseases. The reported biological activities are anti tumor activity, anti-diabetic activity, anti-inflammatory activities, analgesics and antiulcer activity, antioxidant and anti-hyperlipidemic activity, anti-eosinophilic, anthelmintic activity, antimicrobial activity, nephroprotective, immunomodulatory activity, antioxidant and Free radical scavenging activity, hepatoprotective activities. Wide range of chemical compounds flavanoids, glycosides, saponins, triterpenoids, phenolic compounds, oxepins, fatty acids and phytosterols are present. The present review discusses phytochemistry and pharmacology of *Bauhinia variegata* and its usage in different ailments will be supportive for future researcher.

**Keywords:** *Bauhinia variegata*, Kachnar, Pharmacology.

### INTRODUCTION

Herbal medicine also called botanical medicine or phytomedicine refers to the use of seeds, roots, leaves, bark or flowers for medicinal purpose. Ayurvedic medicines are largely based upon herbs, either single ingredient or in combination (Polyherbal), having specific therapeutic principle. *Bauhinia variegata* Linn is a popular ornamental plant. It is a medium-sized deciduous tree. The flower is very beautiful and attractive that the plant could earn local name like Kachnar, orchid tree, camel's foot, mountain ebony, etc. The bark of this plant is described as astringent and alliterative [1]. The root bark and leaves are depurative, anthelmintic, antiulcer and tumors, analgesics, anti-inflammatory, that are useful in hepatoprotective, immunomodulatory, wound healing, skin disease & leprosy etc. Almost all the species of *Bauhinia* contain antioxidant activity and the pharmacological effects and prospects for future clinical used has been tried so far.

### TAXONOMICAL HIERARCHY

Kingdom : **Plantae**  
Subkingdom : **Tracheobionta**  
Superdivision : **Spermatophyta**  
Division : **Magnoliophyta**  
Class : **Magnoliopsida**

Subclass: **Rosidae**

Order : **Fabales**  
Family : **Fabaceae**  
Genus : **Bauhinia**  
Species : **Bauhinia variegata**

### VENTRICULAR NAMES

English : Mountain Ebony  
Hindi : Kachanar  
Kannada: Kempu mandara  
Bengali : Kanchana  
Marati : Koral  
Telugu : Devakanchanamu  
Tamil : Mandare  
Gujarati : Chapmakati  
Malayalam : Koral, Kanchan

### DISTRIBUTION

*Bauhinia variegata* medium-sized, deciduous tree, found throughout in India ascending up to 1800 m in the Himalayas. The Hong Kong Orchid tree, botanically known as genus *Bauhinia*. The origin of the Hong Kong Orchid Tree is China. The name Bauhinia was named after the Bauhin brother who were sixteenth century herbalists [2].

Corresponding Author: **Dr. Kishu Tripathi** Email:- kishutripathi@rediffmail.com

## MORPHOLOGY



### Leaves

Leaves are rather broader than deep, rigidity subcoriaceous, deeply cordate with two leaflets, connate for about two-third up, leaflets are ovate, rounded at apex, 10-15 cm long, pubescent beneath when young.

### Bark

Bark is grey with longitudinal cracks and pale pink inside.

### Flower

Flower are variously coloured, in few-flowered, lateral, sessile or short peduncled corymbus, the uppermost petal darker and variegated usually appearing before the leaves in short axillary or terminal racemes, stamens 5, staminodes absent.

### Fruit

Fruit are flat elongated, pods or pods like; head glabrous dehiscent pods, dry or hard 12-15 inches long contain 10-15 seeded.

## BIOACTIVE COMPONENT IN BAUHINIA VARIEGATA

*Bauhinia variegata* contain major class of flavanoids, glycosides, saponins, triterpenoids, phenolic compounds, oxepins, fatty acids and phytosterols. The stem contain  $\beta$ -sitosterol, lupeol, kampferol-3glucoside and 5, 7-dihydroxy and 5, 7-dimethoxy flavanone-4-O- $\alpha$ -L-rhamnopyranosyl- $\beta$ -D glucopyranosides. The pale violet flowers contain cyanidine-3-glucoside and malvidine-3-glucoside, malvidin-3-diglucoside and peonidin - 3diglucoside. While the white flowers contain kaempferol-3-galactoside and kaempferol-3-rhamnoglucoside. Five flavonoids isolated from the different part of *Bauhinia variegata* has been identified as quercetin, rutin, apigenin 7-O-glucoside. Phytochemical analysis of the root bark of *Bauhinia variegata* Linn was reported to contain a new flavanone: (2S)-5,7-dimethoxy-3',4'-methylene dioxyflavone(1) and a new dihydrobenzoxepine 5,6-dihydro-1,7dihydroxy-2-methylbenz (b,f) oxepin [3].

## PHARMACOLOGICAL ACTIVITY

### Anti tumor Activity

Raj Kapoor B et al (2003) evaluated antitumor activity of ethanolic extract of *Bauhinia variegata* against Dalton's acytic lymphoma in swiss albino mice. A significant enhancement of survival time of BE treated tumor bearing mice was found with respect to control group [4-6].

### Antimicrobial activity

S Pahwa et al (2011) investigated antimicrobial activity of methanolic extracts of leaf, bark and flower of *Bauhinia variegata* studied against various standard reference bacterial and fungal strains and clinical isolates collected from various parts of India and abroad. The antimicrobial susceptibility was screened using serial dilution and disc diffusion methods. Ciprofloxacin and Griseofulvin were used as standard drugs. The results

showed that the extracts were active against both bacteria (Gram positive and Gram negative) & fungi and amongst the three parts studied, the methanolic extract of bark showed comparatively higher antibacterial and antifungal activity than the other two parts studied. Preliminary phytochemical screening of the methanolic extract of the bark proved the presence of flavonoids, glycosides and saponins in it. The bark extract was active against almost all *Shigella* species, most of the *V. cholera* strains, *E. coli* 597, *E. coli* K88, *Enterobacter* AP596, *S. aureus*, *B. cereus*, *B. subtilis* *Pseudomonas putida* MTCC 2252, *Ps. aeruginosa* AP 585 NLF, *Proteus vulgaris* AP 679 NLF and all tested fungal species, except *Penicillium chrysogenum* MTCC 2725. The results of the study indicated that the bark of *Bauhinia variegata* possessed a broad spectrum of antimicrobial activity [7].

#### **Anthelmintic Activity**

Previous researchers investigated anthelmintic activity of *Bauhinia variegata* against *Pheretima posthuma* and *Ascaridia galli*. All extracts exhibited a dose dependent (25, 50 and 100 mg/ml) inhibition of spontaneous motility (paralysis) and time of death of the worms. Extract obtained from bark not only killed the *Pheretima posthuma* but also killed the *Ascaridia galli*. The observations were comparable with standard drug Piperazine citrate at a concentration of 20 mg/ml and distilled water as control. Maximum vermicide activity was shown by both extract at the concentration of 100mg/ml. From the experiment performed, it can be said that the aqueous and chloroform extract of bark of *Bauhinia variegata* bearing a potential anthelmintic activity

#### **Antiinflammatory activities**

Rao et al (2008) was reported antiinflammatory agents, six flavonoids, namely kaempferol (1), ombuin (2), kaempferol 7,4'-dimethyl ether 3-O- $\beta$ -D-glucopyranoside (3), kaempferol 3-O- $\beta$ -D-glucopyranoside (4), isorhamnetin 3-O- $\beta$ -D-glucopyranoside (5) and hesperidin (6), together with one triterpene caffeate, 3 $\beta$ -trans-(3,4-dihydroxycinnamoyloxy)olean-12-en-28-oic acid (7) were isolated from the non-woody aerial parts of *Bauhinia variegata*. Compounds 1–7 were evaluated as inhibitors of some macrophage functions involved in the inflammatory process. These seven compounds significantly and dose dependently inhibited lipopolysaccharide (LPS) and interferon (IFN)- $\gamma$  induced nitric oxide (NO), and cytokines [tumor necrosis factor (TNF)- $\alpha$  and interleukin (IL)-12]. The concentration causing a 50% inhibition (IC<sub>50</sub>) of NO, TNF- $\alpha$  and IL-12 production by compounds 1, 2 and 7 was approximately 30, 50 and 10  $\mu$ M, respectively, while at 50, 40 and 200  $\mu$ M compounds 3, 4, and 5, 6 showed 15–30% inhibition, respectively. On the other hand, compounds 3 and 7 showed no inhibitory effect, while compounds 1, 4–6 reduced the synthesis of NO by macrophages by around 10–30%, when inducible NO synthetase was already expressed with LPS/IFN- $\gamma$  for 24 h. These experimental findings lend pharmacological support to the suggested folkloric uses of the plant *Bauhinia variegata* in the management of inflammatory conditions.

#### **Analgesics and antiulcer activity**

Yamini R et al (2011) evaluated analgesic and antiulcer activities of ethanolic (BVE) and aqueous (BVA) extract of root of *Bauhinia variegata*. The analgesic activity was evaluated for its central and peripheral pharmacological action by using Eddy hot plate method and acetic acid-induced writhing, respectively. The antiulcer activity was evaluated by using pylorus ligation, ethanol and aspirin induced ulcer models. The study was carried out in two different dose level of 200 and 400 mg kg<sup>-1</sup> body weight orally for both ethanolic and aqueous extracts, respectively.

#### **Nephroprotective**

Sharma R et al (2010) evaluated the ethanolic and aqueous extracts of root of *Bauhinia variegata* for nephroprotective effect in Gentamicin-induced nephrotoxicity in rats. Nephrotoxicity was induced in Wistar rats by intraperitoneal administration of gentamicin 100 mg/kg/day for eight days. Ethanolic and aqueous extracts of root of *Bauhinia variegata* at dose of 200 and 400 mg/kg b.w. were concurrently given by oral route. Serum creatinine, serum urea, urine creatinine and blood urea nitrogen (BUN) were determined on day 9. Histopathological study of kidney was also done. The extracts produced significant nephroprotective activity in Gentamicin-induced nephrotoxicity model as evident by decrease in elevated serum creatinine, serum urea, urine creatinine and BUN levels which was further confirmed by histopathological study. Gentamicin-induced glomerular congestion, blood vessel congestion, and epithelial desquamation, accumulation of inflammatory cells and necrosis of the kidney cells were found to be reduced in the groups receiving the root extract of *Bauhinia variegata* along with gentamicin.

#### **Antioxidant and Antihyperlipidemic Activity**

Rajani GP et al (2008) evaluated alcoholic and aqueous extracts of *Bauhinia variegata* can effectively decrease plasma cholesterol, triglyceride, LDL and VLDL and increase plasma HDL levels. In addition, the alcoholic and aqueous extracts have shown significant antioxidant activity. By the virtue of its antioxidant activity, *Bauhinia variegata* Linn may show anti hyperlipidemic activity.

#### **Antioxidant and Free Radical Scavenging Activity**

Pandey S et al (2012) evaluated *in-vitro* antioxidant and free radical scavenging potential of methanolic extracts of *Bauhinia variegata*. Different parts of *Bauhinia variegata* like leaves, bark and flowers have free radical scavenging activity by hydroxyl radical scavenging method. All extracts have different level of antioxidant activity. Methanolic extracts was found to be good solvent for extraction and having good antioxidant activity. IC<sub>50</sub> value of *Bauhinia variegata* leaf, stem bark and floral buds are 17.9, 19.5 and 17.2  $\mu$ g/ml. The reducing power of extracts was carried out with ascorbic acid as a standard reducing agent. In this plant (*Bauhinia variegata*) leaf, stem bark and floral buds extracts there was a

remarkable concentration dependent free radical scavenging and reducing power was exhibited. These findings demonstrated that *Bauhinia variegata* possess free radical and hydroxyl radical scavenging activity as well as antioxidant activity *in-vitro* [8,9].

#### **Immunomodulatory Activity**

Shaikh *et al.* (2011) evaluated immunomodulatory effect of ethanolic extract of stem bark of *Bauhinia variegata* in swiss albino mice. Specific cell mediated immune response was studied by performing delayed type of hypersensitivity (DTH) model in mice treated with ethanolic extract of stem bark of *Bauhinia variegata*(EBV). The non specific immune response was studied by performing the model of cecal ligation and puncture (CLP) induced abdominal peritonitis in mice treated with EBV. In DTH model EBV at the dose of 250 and 500 mg/kg p.o. showed significant rise in the mean difference of footpad thickness in immunosuppressed group when compared with cyclosporine control.

In the cecal ligation and puncture induced abdominal peritonitis model, EBV at the dose of 500 mg/kg p.o showed significant increase in survival of animals. EBV shows the specific activation of cellular immune system in the immunosuppressed animal and also non specifically enhances the immune system by activation of the monocyte macrophage system and natural killer cells. Thereby, it can be concluded that EBV holds promise as immunomodulatory agent which acts by stimulating both specific and non-specific arms of immunity [10].

#### **Hepatoprotective Activity**

Bodakhe S *et al* (2007) carried out to assess to potential of *Bauhinia variegata* bark as hepatoprotective agent. The hepatoprotective activity was investigated in carbon tetrachloride (CCl<sub>4</sub>) intoxicated *Sprague-Dowley* rats. *Bauhinia variegata* alcoholic stem bark extract (SBE) at different dose (100 and 200 mg/kg) were administered orally to male Sprague-Dawley rats between 100-120 g. The effect of SBE on the serum marker enzyme [11]. Sahu G *et al* (2011) also evaluate the hepatoprotective activity of ethanolic extract of *Bauhinia variegata* (EEBV) leaves. Hepatotoxicity was induced by paracetamol in wistar albino rat. Extract was administered orally at different doses (200mg/kg and 400mg/kg). The effect of EEBV on the serum marker enzyme viz. SGOT, SGPT, SALP & serum bilirubin was assessed. Histopathological study was also done to evaluate the hepatoprotective activity.

Present study shows the EBV exhibits hepatoprotective effect by a significant reduction in level of SGOT (53.26%), SGPT (41.64%), SALP (72.30%) and bilirubin (68.18%). It is also preventing liver histopathological changes in rats induced with PCM hepatotoxicity. Overall study reveals that the ethanolic extract of *B. variegata* having significant hepatoprotective

activity [12].

#### **Antiobesity Activity**

The anti-obese activity of *Bauhinia variegata* ethanol extract was studied using dietary animal's model of Obesity. The present pharmacological investigation revealed that HFD elicited significant increase in body weight, food intake, serum levels of glucose, protein, total cholesterol, LDL Cholesterol, VLDL cholesterol, triglycerides, SGOT & SGPT. Treatment with EEBV resulted in reduction of body weight in HFD fed rats indicating that the extract possess weight reducing property. Since obesity is associated with hyperphagia, HFD fed rats consumed more food than normal diet fed rats. EEBV effective in decreasing daily food intake in HFD fed rats, indicating that it possess hypophagic property. The increase in rectal body temperature may be attributed to the overall stimulant and thermogenic property of phytoconstituents of the extract EEBV showed significant reduction in serum levels of total cholesterol, LDL cholesterol, VLDL cholesterol, and triglycerides along with significant increase in serum HDL cholesterol levels in HFD fed rats. Considering the enhancement of cardioprotective lipid HDL, it can be concluded that root of *Bauhinia variegata* is a potent cardioprotective agent [13].

#### **Antidiabetic Activity**

Kumar P *et al* (2012) investigated antidiabetic activity of stem bark of *Bauhinia variegata* in alloxan-induced hyperglycemic rats. Leaves' extract of *B. variegata* exhibited hypoglycemic effects due to the presence of insulin-like proteins. The hypoglycemic activity may be ascribed to the presence of flavonoids, which have been shown to inhibit cyclooxygenase and promote  $\beta$ -cell regeneration besides having insulin secretory property. Alloxan injection induced significant hyperglycemia ( $P < 0.001$ ) (glucose  $> 250$  mg/dl) in 48 h of administration. BVBE ( $P < 0.001$ ) and metformin ( $P < 0.01$  to  $P < 0.001$ ) treatment significantly reduced the blood glucose levels in hyperglycemic animals. The results revealed the maintenance of blood sugar levels in diabetic rats during the 7 days administration of BVBE throughout the study period [14].

#### **Anti eosinophilic**

Researchers investigated the role of aqueous (BVA) and ethanol (BVE) extracts of the plant against milk-induced leukocytosis and eosinophilia in albino mice [15].

#### **Wound Healing Activity**

Researchers investigated the wound healing activity of the extract using wistar rats. The wound healing activity was assessed by rate of wound closure, period of epithelialisation, hydroxyproline estimation and histopathology study of the granulation tissue for excision wound model and tensile strength for incision wound model [16-18].

**Table 1. Pharmacological Activity of *Bauhinia variegata* Linn: *Bauhinia variegata* contain the different type of chemical moiety having specific pharmacological activity**

Part	Dose	Animal used	Pharmacological Activity	Chemical Compound	References
Bark, Flower	Methanolic and Ethanolic extract 500, 1000mg/kg po	Mice	Anti carcinogenic	Flavonoids, lectin and albumin	[4-10]
Bark, Leaves	Methanolic and Ethanolic 2.5, 5, 10 mg/ml	In-Vitro	Antimicrobial	Alkaloids, Flavonoids, Steroids, Triterpenoids, Saponins, Glycosides	[11-18]
Bark	Petroleum Extract 50, 60, 70, 80, 90, 100mg/ml	In-Vitro	Anthelmintic	Tannins, Phytosterol and Triterpenoids	[18, 19]
Bark, Leaves	95% Ethanolic and Methanolic extract 100, 400 mg/ml po	Albino Rats	Anti-inflammatory	Flavonoids	[20-23]
Bark, Roots	Aqueous and Ethanolic extract 200, 100 mg/ml po	Albino Rats	Antinociceptive	Flavonoids	[24]
Bark	Aqueous and Ethanolic extract 200, 100 mg/ml	Albino Rats	Antiulcer	Flavonoids	[24]
Bark, leaves	Ethanolic and Aqueous extract 200, 400 mg/ml	Albino Rats	Nephroprotective	Flavonoids	[25, 26]
Leaves, Stem Bark, Flower	Methanolic extract	In-Vitro	Antioxidant	Flavonoids	[27-29]
Stem Bark	Methanolic extract	In-Vitro	Antihyperlipidemic	Flavonoids	[28, 29]
Stem Bark	Petroleum ether and Ethanolic extract 250, 500 mg/kg po	Albino mice	Immunomodulator	Flavonoids	[30, 31]
Stem Bark	Ethanolic Extract 100, 200, 400 mg/kg po	Sprague dawly rats.	Hepatoprotective	Flavonoids	[32, 33]
Roots	Ethanolic extract 200, 400 mg/kg po	Wister rats	Antiobesity	Flavonoids	[34]
Bark	Methanolic Extract 50, 100 mg/kg po	Albino mice	Antidiabetic	Flavonoids	[35, 36]
Bark	Aqueous and Ethanolic extract 100, 200mg/kg po	Albino mice	Antieosnophlic	Triterpenoids	[37]
Bark Leaves	Methanolic extract 50, 100 mg/kg po	Wister Rat	Wound Healing	Flavonoids, Lectin	[39-42]

## CONCLUSION

*Bauhinia variegata* widely distributed throughout in India. The plant appears to have several activities. In the present article, we had a review on the relevant properties such as ethnobotany, Phytochemical and Pharmacological information on the *Bauhinia variegata*. Arritical analysis of the literature revealed that this plant contain different constituents which are responsible for various activities.

The present review of literature revealed that the plant having antitumor activity, anti diabetic activity, anti inflammatory activities, analgesics and antiulcer activity, antioxidant and anti hyperlipidemic activity, anti eosinophilic, anthelmintic activity, antimicrobial activity, nephroprotective, immunomodulatory activity, antioxidant and Free radical scavenging activity, hepatoprotective Activity.

## REFERENCES

1. The Wealth of India Raw Material. A Dictionary of Indian Raw Material and Industrial Products, Council of Scientific Indian Research New Delhi, 2, 1952, 56-57.
2. The Ayurvedic Pharmacopeia of India: Government of India Ministry of Health and Family Welfare, Department of Ayush, 1(1), 13-74.
3. Tripathi B. Charak Samhita. Chaukhamba Surbharati Prakashan, Varanasi, 3, 1994, 2.
4. Raj Kapoor B, Jayakar B and Murgesh N. Antitumor activity of *Bauhinia variegata* on Dalton's ascetic lymphoma. *Journal of Ethnopharmacology*, 89(1), 2003, 9.
5. Raj Kapoor B, Jayakar B and Murgesh N., Sub chronic toxicity of plant extract *Bauhinia variegata* on rats. *Journal of Ecotoxicology and Environmental Monitoring*. 14(1), 2003, 71-74.

6. Raj Kapoor B, Jayakar B, Murgeshand ND. Akthisekaran. Chemoprevention and cytotoxic effect of *Bauhinia variegata* against N-nitrosodiethylamine induced liver tumors and human cancer cell lines. *Journal of Ethnopharmacology*, 104, 2006, 407-409.
7. Pahwa S, Mazumder R, Bhattacharya S. Evaluation of in vitro antimicrobial activity of different parts of *Bauhinia variegata* Linn. *International Journal of Pharm Tech Research*, 3, 2011, 1971-1977.
8. Pandey S, Agarawal RC., et al. Effect of *Bauhinia variegata* bark extract on DMBA-induced Mouse skin Carcinogenesis:- A Preliminary Study. *Global Journal of Pharmacology*, 3(3), 2009, 158-162.
9. Pandey S, Agarawal RC. Chemopreventive Potential of *Bauhinia variegata* flower extract against DMBA-induced skin papillomagenesis in Mice. *Pharmacologyonline*, 1, 2010, 39-46.
10. Shaikh S, Ghaisas M, Deshpande A, Karpe S, Manikrao A. Immunomodulatory activity of Ethanolic Extract of stem bark of *Bauhinia variegata* Linn. *Pharmacologyonline*, 2, 2011, 164-170.
11. Bodakhe SH, Ram A. Hepatoprotective Properties of *Bauhinia Veriegata* Bark Extract. *Yakugaku Zasshi The Pharma Society Japan*, 127(9), 2007, 1503-1507.
12. Sahu S, Subrahmanyam EVS, Kodangala C, Shastry SC. Isolation and Characterization of triterpenoids and fatty ester of triterpenoid from leaves of *Bauhinia variegata*. *Scholars Research Library*, 3(4), 2011, 28-37.
13. Prashar Y, Venkatraman S. Evaluation of ethanolic extract of *Bauhinia variegata* Linn. In High fat diet induced obesity in rats. *International Journal of Phytopharmacology*, 1(2), 2010, 103-108.
14. Barraiya S, Gaidhani SN, Gupta MD, Wanjari MM, Kumar P. Antidiabetic activity of stem bark of *Bauhinia variegata* in alloxan –induced hyperglycemic rats. *Journal of Pharmacology & Pharmacotherapy*, 3(1), 2012, 64-66.
15. Mali RG, Dhake AS. Evaluation of effects of *Bauhinia variegata* stem bark extracts against milk-induced eosinophilia in mice. *Journal of Advance Pharmatech Research*, 2(2), 2010, 132-134.
16. Luiz GNN, Luciano SP, Rafaela MB., et al. Effect of the lectin of *Bauhinia variegata* and its recombinant isoform on surgically induced skin wounds in a murine model. *Molecules* 16, 2011, 9298-9315.
17. Vijayabhaskar K, Sravanprasad M, Venkateswarlu G, Devi PS, Kumar HK. Wound healing activity of *bauhinia purpurea* in albino wistar rats. *Asian Journal of Research Pharma Science*, 1(2), 2011, 47-49.
18. Ambiga S, Narayan R, Durga G, Sukumar D, Madhavan S. Evaluation of wound healing activity of flavonoids from *Ipomoea carnea jacq.* *Ancient Science of Life*, 24(3), 2007, 45-51.
19. Brown JP. A review of the genetic effect of occurring flavonoids, anthraquinones and related compounds. *Mutation Research*, 75, 1980, 243-277.
20. Hirano T, Oka K, Akiba M. Antiproliferative effect of synthetic and naturally occurring flavonoids on tumour cells of human carcinoma cells lines. *Research Communication in Chemistry, Pathology and Pharmacology*, 64, 1989, 69 -78.
21. Parekh J, Karathia N, Chanda S. Evaluation of antibacterial activity and phytochemical analysis of *Bauhinia variegata* L bark. *African Journal of Biomedical Research*, 9, 2006, 53-56.
22. Sinha K, Verma AK. Evaluation of Antimicrobial and Anticancer activities of Methanol Extract of *in vivo* and *in vitro* grown *Bauhinia variegata* L. *International Research Journal of Biological Sciences*, 1, 2012, 26-30.
23. Gunalan G, Saraswathy A, Krishnamurthy V. Antimicrobial Activity of Medicinal Plant *Bauhinia variegata* Linn, *International Journal of Pharmacy and Biological Sciences*, 1, 2011, 400-408.
24. Dhale DA. Phytochemical screening and antimicrobial activity of *Bauhinia variegata* Linn. *Journal of Ecobiotechnology*, 3(9), 2011, 04-07.
25. Kulshrestha PK, Mishra AK., et al. The antimicrobial activity of *Bauhinia variegata* Linn flower extract (methanolic). *Asian Journal of Pharmaceutical and Clinical Research*, 4, 2011, 46-47.
26. Mali RC, Mahajan SG, Mehta AA. Evaluations of *Bauhinia variegata* Stem bark for anthelmintic and antimicrobial properties. *Journal of Natural Remedies*, 8, 2008, 39-43.
27. Gupta D, Chandrashekar, Richard L and Gupta N. Anthelmintic activity of stem bark of *Bauhinia purpurea* Linn. *Scholar Research Library*, 4, 2012, 662-664.
28. Rao KY, Fang SH, Tzeng YM. Anti inflammatory activities of flavonoids and a triterpene caffeate isolated from *Bauhinia variegata*. *Phytotherapy research*, 22, 2008, 957-962.
29. Saha S., et al. In vivo Study for Anti-Inflammatory Activity of *Bauhinia Veriegata* leaves. *Pharmaceutical Corp*, 2, 2011, 70-73.
30. Pooja, Vyash M. Phytochemical screening and anti inflammatory activity of *Bauhinia variegata*. *Pharma Science Monitor*, 2011, 2943-2958.
31. Bairagi SM, Aher AA, Nema N, Nimase PK. Anti-inflammatory evaluation of methanolic extract and aqueous fraction of the bark of *Bauhinia variegata* (Leguminosae). *International Journal of Research in Pharmacy and Chemistry*, 2, 2012, 77-82.
32. Yamini R, Rajani GP. Analgesic and anti ulcer activities of ethanolic and aqueous extract of root of *Bauhinia variegata*. *International Journal of Pharmacology*, 7, 2011, 616-622.
33. Mishra S, Pani SR and Sahoo S. Nephroprotective effect of *Bauhinia variegata* whole stem extract against cisplatin-induced nephropathy in rats. *Indian Journal of Pharmacology*, 43, 2011, 200-202.

34. Sharma RK, Sharma V, Rajani G, Komala N. Effect of ethanolic and aqueous extracts of *Bauhinia Variegata* Linn on Gentamicin-Induced Nephrotoxicity in rats, *Indian Journal of Pharmaceutical Education and Research*, 45, 2010, 192-198.
35. Pandey S, Agrawal RC, Maheshwari C. In-Vitro Antioxidant and Free Radical Scavenging Activity of *Bauhinia variegata* Linn, *International Journal of Scientific and Research Publications*, 2, 2012, 1-5.
36. Rajani G, Ashok P. In vitro antioxidant and anti hyperlipidemic activities of *Bauhinia variegata* Linn, *Indian Journal of Pharmacology*, 41, 2009, 227-232.
37. Xie W, Wang W, Su H, Xing D, Cai G, Du L. Hypolipidemic mechanisms of *Ananas comosus* L. leaves in mice: Different from fibrates but similar to statins, *J Pharmacol Sci*, 103, 2007, 267-74.
38. Ghaisas M, Shaikh S, Deshpande A. Evaluation of the immunomodulatory activity of ethenolic extract of the stem bark of *Bauhinia veriegata* Linn, *Indian Journal of Green Pharmacy*, 2009, 70-74.
39. Sahu G, Jain SK, Pathak S. Hepatoprotective activity of ethanolic extract of *Bauhinia variegata* leaves, *Pharmacologyonline*, 3, 2011, 721-728.
40. Murlikrishna KS, Latha KP, Shreedhara CS, Vidhya VP, Krupanidhi AM. Effect of *Bauhinia Purpurea* Linn on Alloxan-induced diabetic and isolated frog's heart. *International Journal of Pharmacy*, 2008, 83-86.
41. Min JT, Ji MY, Nigel T., et al. Antidiabetic activities of triterpenoids isolated from bitter melon associated with activation of the AMPK pathway, *Chemistry & Biology*, 15(3), 2008, 263-273.
42. Saroja M, Santhi R, Annapoorani S. Wound healing activity flavonoid fraction of *Cynodon dactylon*, *International Research Journal of Pharmacy*, 3(2), 2012, 230-231.