



AN OVERVIEW ON THE MEDICINAL BENEFITS OF *PYROSTEGIA VENUSTA*

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Abstract

Phytochemicals derived from the secondary metabolites has been emerged out as a source of drugs in Pharmaceutical Industry. These Plant constituents are playing an important role as a therapeutic agents in many diseases. One of the several family of the Plant kingdom, family Bignoniaceae has been of great importance of which many chemical constituents like naphthoquinones, of the lapachol type, iridoid glucosides, alkaloids, flavones, triterpenes, polyphenols, tannins and seed oils *Pyrostegia venusta* (Ker Gawl.) Miers, a popular ornamental plant is cultivated throughout the tropics, and is native to the Brazil. In the traditional Brazilian medicine, the aerial parts of *Pyrostegia venusta* are used as infusion or decoction and administered orally as a general tonic, as well as a treatment for diarrhoea, vitiligo, cough, and common diseases of the respiratory system related to infections, such as bronchitis, flu and cold. So the present work focuses on different Pharmacological actions of the chemical constituents present in *Pyrostegia venusta*.

Index Terms: Phytochemicals, Pharmacological, Medicinal, Phytoconstituents, DPPH, TLC, HPLC.

I. INTRODUCTION

India has a rich heritage of traditional medicine and the traditional health care system have been flourishing for many centuries. It mainly consists of three major systems namely Ayurveda, Siddha and Unani. Apart from India, these systems of medicine are prevalent in Korea, China, Singapore, West Asia and many other countries. Besides the demand made by these as their raw materials, the demand for medicinal plants made by the modern pharmaceutical industries has also increased manifold. Thus, medicinal plants constitute a group of industrially important crops which bring appreciable income to the country by the way of export. Herbal medicines include herbs, herbal materials, herbal preparations and finished herbal products that contain as active ingredients parts of plants, or other plant materials, or combinations.

II. PHYTOCONSTITUENT OF *PYROSTEGIA VENUSTA*

Pyrostegia venusta is a natural source of Phytochemicals. The medicinal herb is a bio-synthetic laboratory as it contains a number of chemical compounds like glycosides, alkaloids sterols, resins etc. these compounds exerts therapeutic effects and account for medicinal property of the herbs. Family Bignoniaceae is a dicot family, which contains 100-125 genera and 700-800 species. Chemical constituents recognized in the family are naphthoquinones of the lapachol type, iridoid glucosides, alkaloids, flavones, triterpenes, polyphenols and tannins and seed oils.

III. PHARMACOLOGICAL EFFECTS OF PLANT

Pyrostegia venusta (Ker Gawl.) Miers is used in traditional medicine for the treatment of vitiligo, dysentery, immoderate menstrual flow, common diseases of the respiratory system, and for the treatment of genital infections. Native Brazilians administer decoction of aerial parts of *P. venusta* for the treatment of cough and flu and also as an infusion to treat diarrhoea, vitiligo, and jaundice. Some of the Immuno-modulatory Study of the methanol extract of flowers and leaves of *P. venusta* showed stimulation of the immune system. It support increase in anti-inflammatory and suppress pro-inflammatory cytokines too. From the Literature different studies on the *Pyrostegia venusta* showed different Pharmacological aspects which can be used further for the generation of some active Pharmaceutical Products in future. Some of the literature work has been mentioned in the present Review which is as follows:

- **Tyagi et al.,(2020)** prepared different extracts of *Pyrostegia venusta* flowers from non-polar to polar with the Phytochemical analysis and thin layer chromatography of different extracts were done for the determination of anti-inflammatory activity.
- **Reyes-Martinez et al., (2019)** studied callus from *Pyrostegia venusta* were exposed to polyethylene glycol, sucrose, or were irradiated with UV light to enhance the content of phenolic acids, flavonoids, and antioxidant activity. The biomass was doubled in the control and callus treated with PEG and triplicated in the medium with sucrose in relation to the inoculum at day 21. The highest levels of phenolic acids and flavonoids were obtained in irradiated callus. Phenylethanoid glycosides, as verbascoside, isoverbascoside and leucosceptoside A were identified. The metabolites present in callus presented vasorelaxant activity (65 to 100%). The vasodilation was inhibited between 80 and 90%, in the presence of N^G-nitro-l-arginine methyl ester, indomethacin or tetraethylammonium chloride but was not affected by atropine.
- **Coimbra et al., (2019)** evaluated the growth, morphology and bioactive phenolic compounds production in *P. venusta* calli, cultures were established on MS medium supplemented with 4.52µM of 2,4-dichlorophenoxyacetic acid and 8.88µM 6-benzylaminopurine in the absence of light. Morphological analyses were performed with scanning and transmission electron microscopy. Total proteins, amino acids, soluble and reducing sugars, phenols, and flavonoids contents were quantified by

spectrophotometric assays, and the phenolic compounds profile was evaluated by high-performance liquid chromatography. The calli growth showed a sigmoidal pattern, with four distinct phases: lag, exponential, linear and decline phases. Ultrastructural analysis showed cells with meristematic characteristics at the start of the culture (lag and exponential phases), cellular organizations in clusters in the linear phase and ruptured cells without visible organelles in the decline phase. The highest levels of primary metabolites (proteins, amino acids, soluble and reducing sugars) and secondary metabolites (phenols and flavonoids) were observed at 10 days of culture (lag phase) and in general decreased with callus growth.

- **Usman and Choubey, (2017)** worked on pharmacognostic and antioxidant studies of stems of *Pyrostegia venusta*. Some distinct and different characters were observed with section of young thin stems. Physiochemical parameter ash value and LOD of powder of stem was 1.85% w/w and 6.53 % w/w respectively. The phytochemical investigation of extracts of stem of *Pyrostegia venusta* shows the presence of sterols, triterpenes, flavonoids and tannins. Total phenolic content of total methanolic extract was determined by using folin Ciocalteu method. The total phenolic content in methanolic extract was found to be 5.55 % w/w equivalent to Tannic acid. Petroleum ether, ethyl acetate soluble, ethyl acetate insoluble and methanol extract was found to be scavenger of DPPH radical.
- **Zari and Zari, (2015)** reported *P. venusta* is internationally one of the most popular and beautiful flowering climbers. It is a natural source of antioxidants that could serve as inhibitors or scavengers of free radicals. *P. venusta* extracts have been utilized in the treatment of various diseases such as skin diseases. It may be useful in the management of wound healing and cancer. *P. venusta* can be also used in the treatment of hypopigmentation diseases such as vitiligo by stimulation of melanogenesis. This plant may supply us with pharmaceutical preparations for the treatment of common diseases related to infections. Because active ingredients may be found in low concentrations, recently, plant tissue culture can bring the solution, this can assist us explore more pharmacological activities. This species could be an important source for pharmaceutical products, and could form a good basis for further research in the potential discovery of new natural bioactive compounds.
- **Altoe et al., (2014)** evaluated the antioxidant potential and phytochemistry composition of *P. venusta* leaves. Different methodologies were adopted like DPPH assay and cell viability assays were performed against the marketed drugs like indomethacin, acetylsalicylic acid, betamethasone and Piroxicam.
- **Mostafa et al., (2013)** reviewed on traditional uses, phytochemistry and pharmacology of *Pyrostegia venusta*. Phytochemical studies on *Pyrostegia venusta* have shown the presence of triterpenes, sterols, flavonoids, fatty acids, n-alkanes, nitrogenous compounds as allantoin and carbohydrates. Crude extracts of *Pyrostegia venusta* possess a wide range of pharmacological activities, such as antioxidant, anti-

inflammatory, analgesic, antinociceptive, wound healing, antimicrobial, and useful in the treatment of disorders that induced sickness behavior, such as flu and cold. Also used to reduce menopausal symptoms, and for enhancement of melanogenesis.

- **Kumar et al., (2013)** reviewed on the botanical description, traditional uses, phytochemistry and pharmacology of *Pyrostegia venusta*.
- **Moreira et al., (2012)** investigated the melanogenic activity of hydroalcoholic extracts from the leaves and flowers of *P. venusta* on murine B16F10 melanoma cells. Both extracts, leaves and flowers increased the melanin content in a concentration dependent manner after 4 days of incubation on melanoma cells. Leaves extract promoted enhancement of melanogenesis with maximum effect of $33.3 \pm 3\%$ ($3 \mu\text{g/mL}$), and the flower extract increased in $23.4 \pm 3\%$ ($0.1 \mu\text{g/mL}$). The cell viability test using MTT showed that in the same tested concentrations of both extracts no cell death was detected. Actually, either extract was not able to cause any change in the tyrosinase activity. HPLC analysis of *P. venusta* extracts found 0.09% and 1.08% of allantoin on leaves and flowers extracts, respectively.
- **Silva et al., (2012)** investigated the antitumor and cytotoxicity activities of *Kielmeyera coriacea* and *Pyrostegia venusta* extracts. The extracts were evaporated and the dry extracts were diluted at concentrations of 1.0, 0.1, 0.01 and 0.001 mg/ml for carrying out the bioassays. *Artemia salina* eggs were incubated in saline solution at 28°C for 24 h. The larvae were treated with different extracts concentrations and the mortality was evaluated after 24 and 48 h. Five discs of potato were placed in Petri dishes and $50 \mu\text{l}$ of inoculum of *Agrobacterium tumefaciens* were added to it at 28°C for 24 h incubation. So, $50 \mu\text{l}$ of the extracts in different concentrations were added. Positive and negative controls were made. The *P. venusta* and *K. coriacea* extracts did not show statistically significant acute toxicity. According to the obtained results it was established that the *K. coriacea* and *P. venusta* extracts showed antitumor activity but did not show significant cytotoxic activity in *A. salina* test.
- **Nisha et al., (2011)** evaluated the anthelmintic property of chloroform and methanol extracts of *Pyrostegia venusta* using *Pheretima posthuma* as an experimental helminthes model. Piperazine citrate was used as the standard reference. Five different concentrations (2.5, 5.0, 7.5, 10.0 and 12.5 mg/ml) of chloroform and methanol extracts were used to determine their effect as time taken to paralysis and time to induce death in the worms. Among the various concentrations of chloroform extract tested, 12.5 mg/ml showed efficient anthelmintic activity with paralysis time (23 min) and death time (44 min). Among all the concentrations of methanolic extract tested, 12.5 mg/ml showed significant results with paralysis time (34 min) and death time (78 min) respectively. This investigation revealed that

chloroform extract was more effective in its anthelmintic action against *Pheretima posthuma* when compared to methanolic extract.

- **Veloso et al., (2012)** discussed about the Anti-inflammatory and antinociceptive effects of the hydroethanolic extract of the flowers of *Pyrostegia venusta* in mice. The *P. venusta* hydroethanolic extract was used for the evaluation of the above mentioned actions and the presence of acacetin -7-O- β -glucopyranoside was suggested.
- **Roy et al., (2011)** assessed the *in-vitro* antioxidant activities and screened the phytochemical constituents of methanolic extracts of *Pyrostegia venusta* (Ker Gawl) Miers. Phytochemical analyses revealed the presence of terpenoids, alkaloids, tannins, steroids, and saponins. The reducing ability of both extracts was in the range (in $\mu\text{m Fe(II)/g}$) of 112.49-3046.98 compared with butylated hydroxytoluene (BHT; 63.56 ± 2.62), catechin ($972.02 \pm 0.72 \mu\text{m}$) and quercetin 3208.27 ± 31.29 . A significant inhibitory effect of extracts of flowers ($\text{IC}_{50} = 0.018 \pm 0.69 \text{ mg/ml}$) and roots ($\text{IC}_{50} = 0.026 \pm 0.94 \text{ mg/ml}$) on ABTS free radicals was detected. The antioxidant activity of the extracts of flowers (95%) and roots (94%) on DPPH radicals was comparable with that of ascorbic acid (98.9%) and BHT (97.6%). GC-MS study revealed the presence of myoinositol, hexadecanoic acid, linoleic acid, palmitic acid and oleic acid in the flower extracts.
- **Bouzada et al., (2009)** worked on different traditional plants indigenous to Brazil for Antibacterial, cytotoxic behavior by agar- well diffusion method against *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Salmonella typhimurium*, *Shigella sonnei*, *Klebsiella pneumonia*, *Escherichia coli* and *Bacillus cereus*. The LC_{50} value was calculated.

IV. CONCLUSION

The present overview of *Pyrostegia* showed various medicinal effects of *Pyrostegia venusta* like diarrhoea, vitiligo, and jaundice, immunomodulatory, cytotoxic, antioxidant, antibacterial, anti-inflammatory, antinociceptive, anthelmintic, antitumor effects. Also different parts of the plant has its unique importance like roots, stem, leaves, flowers having different Phytoconstituents and different pharmacological actions. So, the plant will be focused as an emerging source of phytochemicals in Pharmaceutical Industry.

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