

Phytochemistry and biological study on *Glochidion velutinum* Wight

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Abstract

The little monoecious tree known as *Glochidion velutinum* Wight also goes by the names Chinna usiri and velvety melon. It is a member of the family Euphorbiaceae. It is capable of reaching heights of 9 metres and has branches and leaves that are elongated. The nations of India, Burma, and Pakistan make up the majority of this plant's distribution range in the world. A broad variety of human health issues, including as diabetes, inflammation, cancer, wound healing, anti-diarrheal effect, and many more, have traditionally been treated with the plant in its whole as well as with many of its individual parts. Many different kinds of compounds, including triterpenoid, glycosides, alkaloids, proteins, tannins, steroids, flavonoids, and saponins, may be found in plants. The extracts of the plant have been shown to possess a variety of useful qualities, including those that are anti-diabetic, anti-oxidant, anti-urolithiatic, and antibacterial. It is possible to put various approaches to the test in order to determine whether or not they can substantiate the various claims made about the usage of ethnomedicine.

Keywords: *Glochidion velutinum* Wight; Traditional medicine; Biological activity; Phytochemistry

1. Introduction

"Chinna usiri," "Velvety melon," "melon feather foil," and "feather foil downy" are some of the common names for the flattened branches and leaves of *Glochidion velutinum* Wight. This monoecious plant may either become a little tree or a large shrub and belongs to the family Euphorbiaceae. It can reach a height of up to 9 metres ¹.



Figure 1 *Glochidion velutinum* Wight

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The colour of its bark is more like a harsh brown, while the colour of its wood is more like a mellow brownish white ². The remainder of the portions have a look that ranges from being consistently to densely pale to reddish velvety. The shape of the leaves ranges from elliptic-ovate to elliptic-oblong, and their dimensions range from 5 to 10 centimetres in length and 2 to 6 centimetres in breadth. While the base is in the form of a wedge or a rounded wedge, the apex may have a sharp or somewhat obtusely long pointed appearance. A leaf stalk is typically between 3 and 5 millimetres in length ³. The stems that are just 5–9 mm in length are the ones that carry the male blooms. There are six sepals, and they have the form of an oblong-lance and are between two and three millimetres long, blunt, and thick. The stamen column is 1.5 millimetres long and is composed of three fused sessile anthers. It bears three yellow connectives in the form of a conical cone. When they are fully mature, the female flowers may be found on stalks as small as 1 mm and as long as 6 mm. Sepals on male flowers are often smaller, more emerald in colour, and more resolute. Four to seven cells, eight to fourteen lobes, and a diameter of one millimetre are the characteristics that define an ovary ⁴. The combined styles produce a column with dimensions of 1.5 millimetres in diameter, 1 millimetre in thickness, and 4-7 teeth at the very end of its length. The fruit may have anywhere from 8 to 14 lobes, can range in shape from depressed-globose to discoid, is velvety all over, measures 4 by 10 millimetres, and the style is retained in the depression it was formed in. Red seeds that are irregularly obovoid in shape and measure 3–4 millimetres in length and breadth, with a glossy, smooth surface, are produced by this plant. Even after the fruit has split along the middle, the seeds often continue to be attached to the axis of the fruit. The months of May through July are when blossoming is at its most prolific ⁵.

2. Geographical distribution

In addition to Pakistan, India and Burma are also home to sizeable populations of the species *Glochidion velutinum* Wight. It may be found growing beside highways, in fields, and in other unoccupied locations across India. It is a common plant there. Evergreen forests are the ideal habitat for this species, which may be found at elevations ranging from 600 to 2,000 metres ⁶. The Solas and grassland Akani in the Tadi Likhu watershed, in addition to the Nuwakot region, are the sites where it may be found the most often. Occasional patches may be seen along the river's side in the wet deciduous woods that surround the Akkagarla guide in Tirumala and the water falls in Talakona, Kambakam. Both of these locations are in the state of Tamil Nadu. Its usual habitat is dry, mountainous terrain. It is possible to find it growing wild on the South Andaman Islands in addition to the North Andaman Islands. It has been seen growing wild in a variety of regions across the world, such as Baluchistan, Ceylon, Tropical Asia, Africa, Australia, and the United States ^{7,8}.

3. Phytochemical studies

First, a phytochemical analysis was performed on several plant components, including the leaves, stem, and root ⁹. The analysis revealed the presence of a variety of phytochemicals, including tannins, alkaloids, flavonoids, starch, saponins, and carbohydrates, among other things. Extracts of *Glochidion velutinum* leaves that were dissolved in methanol, ethyl acetate, and n-hexane were analysed by Islam et al., and they revealed the presence of carbohydrates, alkaloids, steroids, tannins, flavonoids, and saponins. These compounds were discovered by authors who performed research on the roots of *Glochidion velutinum* using petrol ether, chloroform, N-butanol extract, and methanol. The researchers found that these solvents all contained extracts that included carbohydrates, proteins, alkaloids, tannins, steroids, and saponins. Triterpenoid was also noticeably absent from both the bark and leaf extracts, despite the fact that the *Glochidion* genus as a whole, including several of its species like *Glochidion hohenuckeri* and *Glochidion ellipticum*, includes triterpenoid saponins to give variety to the biological potential of the plant ¹⁰.

4. Biological activities

4.1. Antioxidant and cytotoxic activity

The usage of the plant *Glochidion velutinum* in traditional medicine involves the possibility that it might be used to cure cancer. In a recent research, the cytotoxicity of leaf extracts from *Glochidion velutinum* was investigated. *Artesia* saline eggs served as the model system for this investigation (20 mg extract in 400 L of pure Dimethylsulfoxide [DMSO] and sea water [3.8 percent NaCl] for a total volume of 20 mL). The LC₅₀ values for the plant's cytotoxic activity in methanol, ethyl acetate, and n-hexane were 428.57, 651.92, and 598.54 g/ml, respectively. This was evaluated by the proportion of cells that were found to be dead after the experiment. It has been discovered that the extracts of the blade in methanol, ethyl acetate, and n-hexane are just somewhat hazardous to one's health. In conclusion, they recommended doing more studies in order to determine the identity of the questionable active component ¹¹.

Sandhya *et al.* examined the leaves, stems, and roots of the *Glochidion velutinum* plant as part of their investigation on the cytotoxic properties of the plant. Following the process of grinding the various plant components into a powder, they were extracted using petroleum ether, chloroform, n-butanol, and water respectively. Testing for cytotoxicity on cell lines derived from Daltons lymphoma ascites (DLA) and Erlisch ascites carcinoma (EAC) were conducted using the trypan blue exclusion method, and brine shrimp were used for tests to determine whether or not the treatment caused mortality. When employing these two early screening procedures for cytotoxicity examinations, the extraction of *Glochidion velutinum* at concentrations of 50, 100, and 200 ng/ml exhibited cytotoxicity ranging from 90 to 100 percent. The n-butanol stem extract had the greatest level of activity among all of the extracts that were examined ¹².

4.2. Antidiabetic activity

Hyperglycemia, glycosuria, and a number of other symptoms are characteristic of diabetes mellitus type 2, which is a metabolic illness. The leaves of *Glochidion velutinum* were tested in alloxane-induced Albino Wistar rats at a dose of 140 milligrammes per kilogramme for their potential anti-diabetic properties. The traditional herbal medicine of the area was discovered to be an excellent and risk-free therapy for diabetes. The results of an investigation of the plant's methanol and water extracts are shown below ¹³. To both normal and alloxane-induced diabetic rats, 400g/kg of crude, watery extract and methanol extracts from the leaves were given. Normal rats also received the methanol extracts. After the rats were administered the oral extract, their blood glucose levels were tested every day for up to 15 days at intervals of 0, 2, 4, 6, and 8 hours throughout the duration of the experiment. These data show that both leaf extracts are quite efficient against hyperglycemia, with the former being on par with the medicine that is considered to be the gold standard, glibenclamide 0.28 mg/kg. The blood sugar level dropped from 314 mg/dL to 155.4 and 160 mg/dL, respectively, after being treated with methanol and an aqueous extract for a period of 15 days ¹⁴.

4.3. Anti-urolithiatic activity

Stones may develop anywhere in the urinary system, including the kidneys, the bladder, and the urethra. This condition is known as urolithiasis. The fact that employing herbal medications to treat urolithiasis does not seem to have any negative side effects is a strong selling point for these therapies ¹⁵. In order to prevent urolithiasis in rat models, the researchers in this study used an extract made of dried *Glochidion velutinum* leaves that had been treated with methanol. In order to induce urolithiasis in rats, a solution containing 0.75 percent ethylene glycol and 1 percent ammonium chloride was given to them to drink for a period of 21 days. After that, extracts containing 250 and 500 mg/kg were tested against 750 mg/kg of cystone, which served as the comparison standard. After a period of twenty-four hours, the levels of calcium, phosphate, oxalate, and BUN in the urine, in addition to the levels of creatinine and uric acid in the serum, were measured and analysed. An examination of the kidneys using histological techniques was also performed. This research provides evidence that *Glochidion Velutinum* has a nephroprotective effect by demonstrating that a methanol extract of dried *Glochidion velutinum* leaves significantly reduced the development of stones in calculogenic mice ¹⁶.

4.4. Anti-bacterial activity

In recent research, high-performance antibacterial procedures were used, and dye resazurin (1 ml of 0.01 percent dye) was used as a bacterial growth indicator. The results showed that an aqueous stem bark extraction of *Glochidion velutinum*, at concentrations ranging from 0.1 to 10 mg/ml, exhibited an exceptional profile as an antibacterial agent ¹⁷. The antibacterial activity of the chosen medicinal extract was evaluated against a number of different bacterial strains, including *E. coli*, *B. subtilis*, *P. aeruginosa*, and *S. aureus*, using a combination of microtitre-plate, colorimetric, and hemocytometric assays (multi-drug resistant strain). Initial testing reveals that concentrations of aquatic extract at 200, 190, and 110 (g/ml) have antimicrobial activity against *Staphylococcus aureus*, *Bacillus subtilis*, and *Pseudomonas aeruginosa*, respectively ¹⁸. This testing was done with streptomycin and tetracycline serving as reference antibiotics. On a medium consisting of nutrient agar, an extract of *Glochidion velutinum* was subjected to an initial antibacterial screening using the disc diffusion method. To create discs with a diameter of 6 millimetres, sterile Whatman-1 filter paper was soaked with 500 grammes of extracts of hexane, chloroform, methanol, and ethanol. The paper was then used to make discs. After that, the discs were very carefully placed on agar plates that had been labelled with the microbe that was being tested. Research on the effectiveness of various leaf extracts as antibacterial agents reveals that those prepared using methanol and ethanol are superior to those made with hexane and chloroform ¹⁹.

4.5. Anti-oxidant activity

Researchers interested in plant extracts are drawn to free radicals like reactive oxygen because of the possibility that they might one day be utilised to treat a wide variety of diseases and conditions, including cancer, arteriosclerosis, heart disease, stroke, and the effects of ageing. Samples of the plant's leaves, stems, and roots were used in this investigation of the antioxidant capabilities of *Glochidion velutinum*. Depending on the section of the plant that was being investigated,

different plant extracts were created using different solvents, including petroleum ether, chloroform, n-butanol, and water. The ability of extracts to scavenge free radicals was evaluated by assessing several properties of the extracts, including their Total Phenolic Content, Superoxide Radical Scan, Hydrogen Peroxide Scavenging, and Hydrogen Peroxide Inhibition caused Erythrocyte Hemolysis, and FRAP Assay ²⁰.

5. Conclusion

Following a study of the academic literature that is currently available, a lot of material on *Glochidion velutinum* Wight was discovered. This plant has been linked to the production of a wide variety of secondary metabolites, each of which has its own unique chemical makeup. It is a widely held belief that the diverse array of pharmacological effects that may be attributed to a plant can be traced back to its unique chemical profile. Researchers have been prompted to give scientific proof of the plant's therapeutic usefulness by the vast ethnomedicinal data that has been accumulated on the plant. Therefore, it is necessary to conduct research into the pharmacological potential of this plant. This research should include the discovery of new bioactive components. As a consequence of this, the report will be useful to future researchers since it will provide them with background information for the job that they do.

Compliance with ethical standards

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Disclosure of conflict of interest

No conflict of interest.

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