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An Overview on Glochidion Velutinum and Its Pharmacological Activity

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ABSTRACT
Glochidion velutinum is a tiny tree or a big shrub belonging to the Euphorbiaceae family which is widespread in India, Nepal and Pakistan. Velvety melons Featherfoil and Downy melon foils are the plant's common names, but its synonyms such as Gynoon heyneanum and Phyllanthus nepalensis are well-known. The entire plant has been reported to be medically important. The different plant species phytochemicals are tannins, flavonoids, alkaloids and steroidal saponins, etc. Various pharmacological effects, such as cytotoxicity, anti-diabetic activity, antioxidant activity and antibacterial activity, were reported with particular plant species. This review emphasises on the pharmacological effects of the different plant extracts with a special emphasis on their purported phytochemicals. A comprehensive, appropriate and up-to-date review was referred to in several databases.

Keywords: Glochidion velutinum, phytochemicals, cytotoxicity, antioxidant, antimicrobial, pharmacological effect

I. INTRODUCTION

Nature is the largest and most trustworthy source of medicinal products that may cure a huge number of conditions and keep people healthier. The best medicinal agents now a day are natural plant compounds. This is the biggest lure for many researchers to focus on the plant kingdom's possible biological activities. Glochidion velutinum is such a promising plant species with an abundance of biological activities. It belongs to the Euphorbiaceae family and is especially famous for its anti-cancer potential. There are around 250 species worldwide, although most of them are still unknown. Glochidion velutinum is a tiny monoecious or large shrub tree with branches and leaves up to 9 metres. It is mostly observed in India, Nepal, China, and so on and is called locally as Matachhar, Chinna usiri, Velvety melon. This herb has traditionally been commonly used to treat diabetes, inflammation, cancer, wound healing and diarrhoea. A far-western Nepal tribal clan named 'Raute' employed bark paste to repair the dislocation of the bones and fruit paste for pimple cure. The raw root, stem and leaf extracts show good membrane stabilisation capabilities for human RBC. The suspected explanation for these activities is the presence or reporting of phytoconstituents, such as alkaloids, tannins, saponins and flavonoids.

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FIG. 1: PLANT OF GLOCHIDION VELUTINUM

Classification:
Kingdom: Plantae
Family: Euphorbiaceae
Genus: Glochidion
Species: Glochidion velutinum

Vernacular names:
English: Velvetymelon feather foil
Malayalam: Cthakkatanv
Tamil: Panickaavu

Geographical source:

Glochidion velutinum is regionally one of the most commonly utilised antifertility plants in the Ethiopian indigenous healthcare system. Easily found on road sides or at field borders and waste areas in India up to an altitude of 2100 m as a weed, as well as on South Andaman Islands. This plant is also widely distributed in Baluchistan, Ceylon, Tropical Asia, Africa, Australia and America worldwide as a weed.

Habit and Habitat:

The plant is scattered throughout India to 3,000 metres above sea level upward or upward herbs or shrubs. In the rainy season it grows. It is erect, linear, 0.8-1 m in height with steep branches, cerate or a quadrangular plant.

Therapeutic uses:

- Antidiabetic
- Antioxidant
- Anticancer
- Anti-inflammatory
- Antimicrobial
- Antiurolithic

Phytochemical constituents:

- Alkaloids
- Tannins
- Saponins
- Proteins and free aminoacids
- Flavanoids
- Carbohydrates

DESCRIPTION

FAMILY: Plants belonging to the Euphorbiaceae family are normally found as milky sap trees, shrubs or herbs. They have plain or pale hair, seldom peltate scales and alternate leaves, sometimes opposite to each other, or palmate at the base. They may be monoecious or dioecious, with small blooms, alone or in clusters, spikes, racemes, pannicles and cymes, or unisexual actinomorphic cups like cyathia. Their calyx consists of 3-6 partially joined sections, petals 3-6 and stamina 2-many, free or joined in different ways form a column or bundles. Ovary is superior and 2-4 is superior to that. The styles are 2-4, free or single, easy or bifid with 1-2 ceel, acile ovules. The fruit normally is a capsule that splits into 2-3 segments, with 1-2 seeds, sometimes fleshy or leathery and sometimes indiscriminate seeds .

GENUS: Glochidion are typically evergreen plants or bushes in which the leaves are alternated, pinnate, complete and stipulated. They are monoecious and their blooms are axillary. Male

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flowers have 6 sepals, no petals, no disc glasses, 3-8 stems and their filaments fit into a column dehiscating with vertical slits. The women's flowers have sepals (6-12), petals (0), ovaries (3-15), connate styles and lobbies at the top, some of them global, some of them brown and flat. Woody capsules are the fruits, lobed 3-15, with a scarlet ari-like covering in each seed .

SPECIES: Glochidion velutinum is a big shrub or tree to 10 metres and its shootings are quite pale. The sheets are elliptical or obovate, ovate widely, 4.5-8 × 2-5cm, sharply or bluntly cuneate base, or rounded. When dried they became dark brown, thickly pubescent under petals 2-3mm. Male flowers are 4-8mm on pedicels, stams 3, whereas female pedicels are 2-5mm, in styles from a slim pubescent column darkened at apex. Capsules are depressed with 9-13 mm globose and 8-12 pubescent lobes are visible.

PHYTOCHEMICAL STUDIES:

Various portions of the plants such as leaves, stem, root, were initially phytochemical researched and various phytochemicals such as tannins, alkaloids, flavonoids, starch, saponins, carbohydrates etc. were detected.

Islam et al. revealed that methanol, ethyl acetate and nhexane extracts of the Glochidion velutinum leafs have been present in carbohydrate, Alkaloid, Steroid, Tannin, Flavonoid and Saponin. In petrol ether extracts, chloroform, N-butanol extract, and methanol extracts from the roots of Glochidion velutinum, Sandhya S et al found carbohydrates, protein, alkaloid, tannins, steroids, and saponins were present .

More interestingly, the absence of Triterpenoid was evident from both bark and leaf extracts, but in many of its species, such as Glochidion hohenuckeri and Glochidion ellipticum, the Glochidion genus largely has triterpenoid saponins to offer diversity of biological potential.

PHARMACOLOGICAL ACTIVITY

CYTOTOXICITY: Glochidion velutinum has an anti-cancer folkloric claim. A recent research on cytototoxicity in leaves of Glochidion velutinum in Artesia saline eggs was done by the use of various leaf extracts [20mg extract in 400 µL of pure Dimethylsulfoxide [DMSO] and sea water [3.8 percent NaCl] for a total volume of 20 mL] to examine the cytotoxicity of the leaves of Artesia Saline. The experiment concluded that plant cytotoxic activity was seen in percentage mortality with LC_{50} values of 428.47µg/ml, 651.92µg/ml and 598.54µg/ml, respectively, and for methanol, ethyl acetate and n-hexane extracts. Here, methanol extracts from the blade have been reported as slightly poisonous, ethyl acetate and n-hexane extracts based on their LC_{50} values. Finally, they urged additional investigation into the active component responsible for this activity .

Sandhya et al evaluated all plant components for assessing the cytotoxic properties of the Glochidion velutinum, such as leaf, stem and root. Powdered and extracted the various plant parts with petroleum ether, chloroform, n-butanol and water. Cytotoxicity evaluations were carried out on the cell lines of Daltons Lymphoma Ascites (DLA) and Erlisch Ascites Carcinoma (EAC) and Brine shrimp death tests using Trypan blue exclusion methods. These are the two preliminary screening approaches for cytotoxicity studies that have shown outstanding results for Glochidion velutinum extracts at concentration between 50, 100 and 200 µg/ml with a 90-100 percent cytotoxicity. N-Butanol stem extract demonstrated increased activity among all extracts .

ANTI OXIDANT ACTIVITY

Plant extract antioxidant activity is very attractive to researchers because of free radicals such as reagent oxygen that can treat a variety of diseases such as heart disease, stroke, arteriosclerosis, cancer, ageing and many more. In this study, all components of the plant, like leaf, stem and root, were employed to evaluate the antioxidant property of the Glochidion velutinum. For different portions of the plant, the various plant extracts were made up of petroleum ether, chloroform, n-butanol and water. The evaluation of the anti-oxidant ability of the extracts was carried out in this area with a view to assessing the Total Phenolic Content, Superoxide Radical Scan, Hydrogen Peroxide Scavenging, Hydrogen Peroxide Inhibition caused Erythrocyte Hemolysis, and FRAP Assay .

A comparative research of Glochidion velutinum non-polar and polar solvent extracts using DPPH-free radical scavenging was carried out with comparable work on antioxidant activity, where free radical scavenging was shown by the colour shift from deep violet to pale-yellow or colourless. The free radical scavenging against a standard Ascorbic acid solution of 1.56 to 50 µg/ml was found at 1.56 to 800 µg/ml of crude extract. The antioxidant activity in all the vier extracts was significantly different, which is seen from LC50, 30 µg/ml, 25.4 µg/ml, 0.755 µg/ml, 2,6 µg/ml for

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hexane, chloroform, methanol and ethanol extracts, respectively .

Total Folin-Ciocalteu (FCR) colorimetric method of 765 nm Phenolic content was also employed as a standard using the Gallic acid method, whereas Quercetin is used as a standard for the total Flavonoid estimate by the aluminium chloride colorimetric method. Extracts of Hexane, Chloroform, Ethanol and Methanol were studied. Overall Phenolic content (29.89 ± 2.28 and 17.9 ± 1.26 mg/gm GAE) was higher and Flavonoid content (48.12 ± 2.28 and 30.22 ± 2.84 mg/gm QE [Quercetin equivalent]) of the different extracts, resulting in superior antioxidant activation .

ANTIDIABETIC ACTIVITY

Diabetes mellitus is a group of hyperglycemia, glycosuria, and so on related metabolic condition. An investigation of the in vivo anti-diabetic efficacy of the leaves of Glochidion velutinum using alloxane (140 mg/kg) induced Albino wistar rat models. The efficiency and safety of indigenous herbal medicines was known as an antidiabetic medication. Methanol and aqueous extracts from the plant were studied. The normal rats as well as the diabetic rats induced with alloxane were injected with 400g/kg of crude, watery extract as well as the methanol extracts from the leaves. After the oral extract administration, the rats' blood glucose levels were monitoring every day for up to 15 days, at a time interval of 0,2,4,6 and 8 hours. This research has shown the strong anti-hyperglycemic efficacy of both the extracts of the leaves comparable to the standard drug Glibenclamide 0.28 mg/kg. The blood sugar level reduced to 155±4 and 160±4mg/DL during 15 days respectively, from 314±5mg/DL by methanol and aqueous extract.

Another study done with diabetic rats produced by Streptozotocin-Nicotinamide type 2 also shows the action of the plant extract. Diabetes mellitus was established by Streptozotocin 60mg/kg and Nicotinamide 120 mg/kg in rats that fasted overnight. Ethanolic extract of the G. velutinum leaves was administered to rats in the dose of 200 and 400 mg/kg, and a significant reduction in blood glucose level comparable to the standard medicine Glibenclamide 10 mg/kg for induced diabetic rats was reported in comparison with diabetic control rats. The two doses of ethanol extract resulted in significant changes in the lipid profile, SGOT, SGPT levels than the diabetic rats. This work also promotes the anti-diabetic action of the plant's methanol extract, where the dose of 400 mg/kg is more active than 200 mg/kg, with a decrease of the percentage of 52.19±2.71 and 31.90±4.05 correspondingly.

ANTIUROLITHIATIC ACTIVITY

The process of stone production is called Urolithiasis in the kidney, bladder and urethra. With herbal drug use in Urolithiasis, no negative effects were documented yet, and that is the main attraction for additional herbal therapies. Methanol extract from dried leaves of the Glochidion velutinum was used for prevention in rat models of urolithiasis for this investigation. 0.75 percent ethylene glycol and 1 percent ammonium chloride were utilised as a 21-day induction of Urolithiasis in rats, and 250 and 500 mg/Kg of extract were assessed for effectiveness while 750 mg/kg Cystone was the reference medication. Then the calcium, phosphate, oxalate and BUN urine, creatinine, uric acid in serum were tested in the 24 hour urine and renal. Histopathological kidney examination was also performed. The conclusion of the investigation was that the methanol extract of the dried Glochidion velutinium leaves was significantly reduced in stone formation in calculogenic rats that confirms the nephroprotective activity of Glochidion Velutinum .

ANTI BACTERIAL ACTIVITY

A recent study applying high-performance antibacterial methods using dye resazurin (1 ml of 0.01 percent dye) as a bacterial growth indicator showed an excellent profile for Glochidion velutinum aqueous stem bark extraction (0.1 to 10 mg/ml) as an anti-bacterial agent. This specific work has been carried out to evaluate the antibacterial activity of the chosen medicinal extract against various strains, such as E. coli, B. subtilis, P. aeruginosa and S. aureus (multi-drug resistant strain), by combining microtitre-plates, colorimetric and hemocytometric assays to evaluate the drug susceptibility. Aquatic extract activity indicates in the preliminary screening against Staphylococcus aureus, Bacillus subtilis, and Pseudomonas aeruginosa of 200, 190, 110 (µg/ml), and 250, 250.200(µg/ml), with streptomycin and tetracycline as reference antibiotics correspondingly .

The preliminary antibacterial screening by the disc diffusion procedure for Glochidion velutinum extract using the nutrient agar medium was done in a similar way. The 6 mm diameter paper discs were manufactured of sterile Whatman-1 filter paper, with 500 µg of hexane, chloroform, methanol and

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ethanol extracts impregnated. Disks were then carefully placed on agar plates which were previously marked in the test micro-organism. The results of antibacterial activity reveal better activity than the hexane and chloroform extracts in the methanol and ethanol extract of the leaves .

II. CONCLUSION:

The review attempted to hypothesise Glochidion velutinum's phytopharmacological character, a prospective natural weapon. Although, Glochidion is a wide-ranging genus with over 250 species of well-known potential and folklore claims, we have to mention that the velutinum of Glochidion is not yet fully studied as documented works. Most Glochidion species are predicted to have their pharmacological effects because of the widespread composition of Flavonoids and Triterpenoids. The phytochemical screening of this particular plant species nonetheless suggests that there are no tritropenoids and polyphenols that attribute the noticeable antioxidant effects. These characteristics also make a valuable platform for future researchers to learn about the true phytochemistry behind the plant. The substantial findings of the numerous extracts as cytotoxic, antioxidant, antidiabetic, anti-urolithic and antibacterial agents will reinforce our trust and will enhance the access of this new chemical to human health.

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