Chlorophytum tuberosum

Subjects: Biology

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Chlorophytum tuberosum (*C. tuberosum*) belongs to the family Liliaceae and is being used in the indigenous systems of medicine as a galactagogue, aphrodisiac, antitumor, immunomodulatory, antidiabetic, analgesic, anti-inflammatory, hypolipidemic, anti-ageing, antimicrobial, etc.

endangered antioxidant activity anticancer

1. Introduction

Chlorophytum tuberosum Baker (Safed Musli) is a member of the Liliaceae family. It can be found in rain-fed regions of India. The plant typically thrives on rocky areas along valleys, grassy slopes, and woodland borders between 1300 and 2800 m [1]. This erect plant can grow up to 1.5 to 2 feet tall, with sheathing leaf bases that are acute to acuminate and have a full border. Ellipsoid tubers are 10–12 cm long and 1.1–1.9 cm in diameter hanging from the tuberous roots [2]. The tuberous roots have significant therapeutic value. The aphrodisiac and galactagogue qualities of Safed Musli are used in addition to its nutritional, health-promoting, immunoenhancing, hepatoprotective, and antioxidant capabilities [3]. The roots are also used as an antipyretic for leucorrhea and fever [4].

The leaves, roots, and seeds of *C. tuberosum* are collected from the forest without care and caution, resulting in severe threats to its survival. Overexploitation and habitat destruction have seriously endangered Safed Musli, which is now on the verge of extinction [5]. Due to their medicinal and commercial value, the tubers of *C. tuberosum* are in high demand, leading to irregular harvesting practices that adversely affect the plant's natural habitat globally. Therefore, this research emphasizes the need for scientific techniques and different regulatory mechanisms for the conservation of this endangered medicinal plant species, *C. tuberosum*.

2. Antioxidant Activity

Although, oxidative reactions are necessary for regular biological functions, they can also be damaging to vital cells if antioxidants are not available. Natural antioxidants include vitamins A, C, and E, as well as enzymes such as catalase, superoxide dismutase, peroxidase, and others, that help us to combat oxidative damage [2]. Reduction in disease and mortality rates has been reported with the consumption of antioxidant-rich foods [6]. Ethanolic extracts of the dried roots of *C. tuberosum* showed very promising results in the reducing capacity assay and DPPH (1,1-diphenyl-2-picrylhydrazyl) radical scavenging activity [7]. Different studies have reported the antioxidant activity of this plant [2][8][9].

3. Antimicrobial Activity

In comparison to traditional antibiotics, ethyl acetate and alcoholic extracts of *C. tuberosum* showed high antibacterial activity. *C. tuberosum* bis-isoflavonoid [Bis (8-methyl-4'methoxy-7-O-α-L-rhamnopyranoside) I-5, II-5 bis-isoflavone] was discovered to have significant antimicrobial properties [10]. The antibacterial activity of aqueous extracts of leaves from eight *Chlorophytum* species was tested using the agar diffusion method against different bacterial and fungal species [11].

4. Anticancer Activity

Saponins are a class of natural compounds that have been proven to have significant cytotoxic potential. As a result, many researchers set out to assess the anticancer potential of saponins from various plant species. However, one such attempt was to look into the effects of different *Chlorophytum* species on leukemia cell lines. Methanolic extract and saponins from different species of *Chlorophytum* were evaluated in vitro on the HL60 leukemia cell line and showed promising results [12].

5. Immunomodulatory Activity

Due to the availability of immunomodulatory potential, a wide variety of plants were employed to treat human illnesses in the past. Traditional herbs have been used for immunostimulatory purposes in Ayurveda and other traditional medical systems [2]. The extract of *C. tuberosum,* which is high in inulin-type fructans, was discovered to have strong immunomodulatory activity for scavenging DPPH, nitric oxide, lipid peroxidation, and ferry bipyridyl complexes [8].

6. Traditional Uses of Chlorophytum tuberosum

To revolute the treatment of sexual disorders, medicinal herbs play an important role. In Indian traditional medicine, *C. tuberosum* is considered the most effective revitalizing herb and is traditionally believed to have effective aphrodisiac properties [2]. In Ayurveda, *C. tuberosum* is used to treat patients suffering from sexual disorders, including erectile dysfunction and premature ejaculation [13]. To cure centipede bites and poisonous bites, the tuber paste of *C. tuberosum* is used as a remedy [14]. The tuber extract of *C. tuberosum* is used during muscle cramps and loose motion fatigue, general weakness, and leucorrhoea [15][16]. Cholera can also be cured using this plant species.

The juice of the roots/tubers as well as the root powder of *C. tuberosum* can be prepared as an energy tonic and used to cure several diseases [17][18][19]. The root of *C. tuberosum*, *Bombax ceiba* L., *Capparis sepiaria* L., and the fruit of *Pedalium murex* L. are used to prepare a powder mixture and is prescribed to take with water as a tonic. The drug obtained from the tubers of this plant species is used as an important nervine and general tonic for strength and vigor [19]. The powder mixture prepared by the root of Safed Musli, twigs of *P. murex*, and seeds of

Sida spp. is used for the treatment of leucorrhoea [20]. Roots of Safed Musli crushed in rice water is an extract used by tribals for the treatment of dysmenorrhoea [21]. The root powder of Safed Musli is used often to provide strength in women after delivery [22]. The combination of Safed Musli's roots and small twigs of *P. murex* with *Sida* seeds is used to cure nocturnal emission. Dry powder of cladodes of Safed Musli with milk every day can be used to cure seminal debility, and also, the root can also help to cure sexual debilities, such as impotency and low sperm count [23][24]. Decoction of leaves and roots of *C. tuberosum* is also used for the treatment of diabetes and some immune disorders [25]. It is supposed that the tubers and roots of the *C. tuberosum* plant have the activity to dissolve kidney stones [24].

7. Reasons for the Extinction of Safed Musli as an Endangered Plant Species

Many plant species have medicinal and therapeutic value and these endangered plant species can be conserved by quarantining a few of such plant species [26]. Ecological balances are necessary for the protection of the environment and self-sustainability. Conservation of biological diversity includes these plant species, including Safed Musli, but due to over-exploitation, these plant species are on the verge of extinction. These plant species are also used for carrying out different scientific and biological experiments to use them in pharmaceutical drugs, but the population puts a severe risk to the natural resources, including flora fauna and endangered plant species [27].

Excessive developmental activities have also destroyed habitats. The growth of development comprises many activities, such as roads, railway lines, dams, mines, and human settlements, which inconsequentially disturb the whole ecosystem and thus affect the normal growth of endangered plant species [27]. The cumulative result of climate change, natural habitats, and population growth development activities affect the overall percentage of flora and fauna, and plant species in the country. These plant species are at risk because of a lack of effective regulatory control mechanisms, which makes the issue of plant species more complex [27].

India is a rich source of biodiversity comprising plants, trees, herbs, and shrubs, which need better protection. As wildlife protection, the Act specifically protects our animals, but unfortunately, except for the Biological Diversity Act 2002, no other specific legislation is enacted targeting the goal of conservation of plant species; as a result, we are losing our rich source of biological diversity [28].

8. Antistress Property

Tuber extracts of *Chlorophytum* are considered antistress agents and have adaptogenic activity [29]. This property is assessed by swim endurance stress, anorexic tests in rats, and the despair swim test. It has been evaluated that under cold stress, an alcoholic extract of *Chlorophytum* sp. significantly enhances the time of swimming and also helps in reducing the ulcer index and weight of the adrenal gland [29].

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