International Journal of Theoretical & Applied Sciences, 11(2): 04-09(2019)

ISSN No. (Print): 0975-1718
ISSN No. (Online): 2249-3247

Review on Ethnomedicinal Plant: *Trillium govanianum* Wall. Ex D. Don

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(Published by Research Trend, Website: www.biobulletin.com)
(Received 03 June 2019; Accepted 28 September 2019)

ABSTRACT: *Trillium govanianum* belongs to the genus *Trillium* (family: Melanthiaceae) commonly known as 'nag chhatri' is a native species of the Himalayas. In folk medicine, the rhizomes of *T. govanianum* are used to treat inflammation, dysentery, menstrual, sexual illnesses, antiseptic and in wound therapeutic. The plant has anti-inflammatory, analgesic, antifungal and anticancer properties. The in depth pharmacological studies are essential for this plant so that the medicinal activities of this plant could further explore.

Keywords: *Trillium govanianum*, Analgesic, Anti-inflammatory, Anticancer, Antifungal.

I. INTRODUCTION

In the traditional system of medicine wild medicinal plants are mainly used. In developing countries more than 80% of the inhabitants is dependent upon traditional system of medicine [1]. The genus *Trillium* widely distributed from the western Himalayas to Japan, China, Russia and North America [9] and is an significant source of bioactive compounds of different classes like glycosides, steroids, sterols, terpenoids, flavonoids, saponins and sapogenins. In Indian Himalayan region *T. govanianum*species is distributed between 2,500 to 4,000 m [41]. The western Himalayan region it is one of the most sought after medicinal species. *T. govanianum*is used in several traditional medicines comprising both sex and steroids hormones [21, 27].

All over the world Medicinal plants as a rich source of therapeutic agents for the prevention of diseases. Himalaya is rich in biodiversity due to a variety of habitat and different climatic condition. India possesses the world's richest medicinal plant heritageand traditional knowledge. All over the world Indian Himalayan region is one of the mega biodiversity regions [10, 12, 16, 17, 39].

In the Indian Himalayan region (IHR) about 279 fodder species [28], 675 wild edibles plants species [29], 1748 medicinal plants species [28], 118 species of oil yielding plants aromatic and medicinal plants [30] and 155 scared plants species have been documented. More than 95 percent of 400 species used in making medicine by different industries and collected from wild populations in India [40]. The state of Himachal Pradesh forms a part of western Himalayas, repository of Medicinal and Aromatics plants and the significant traditional knowledge also associated with these plant species. The natives of Himachal Pradesh are also dependent for food/edibles, medicines, fuel, fodder and several other purposes on forests. The people living in tribal areas still depend on household remedies for health care. The people living this hilly state utilize wild plant resources. It is highly desired to find out excellent medicines for sicknesses that are economical, having no side effects and efficacious in various pathological circumstances. Through traditional medicine studies many drugs have come into international pharmacopoeias [22].

The research on medicinal plants has showed the presence of valuable pharmacologically active compounds with antibacterial, anti-parasitic, anti-cancer, antifungal, and analgesics properties [7, 46]. *Trillium govanianum*is a god gifted medicinal plant, having high medicinal properties. The native people of hilly area, collect rootstock of Nagchatri for treatment of severalillnesses i.e. joint pains, stomach, and wounds etc. and are also involved in extraction of the species for trade.

II. THEORETICAL BACKGROUND

The Botanical Survey of India (BSI) documented above 15,000 plants growing in the country, of which at smallest amount 7,500 species have been used for medicines [45]. The forests of Himachal Pradesh, said to have been the place of birth of Ayurveda, are known to supply a very huge proportion of the medicinal plant necessities [2].

In India since the Vedic age the use of plants for medicinal purposes and human sustenance has been in practice. India is one of the chief suppliers to the world in relations of raw materials and herbal drugs [8]. India is an active participant in the global medicinal plants

market having the world's largest supplier of raw materials. Medicinal plants are one of the most significant constituents of the non-wood forest products sector [13].

In traditional health care and several cultures around the world medicinal plants have been used from centuries for primary health care. In developed as well as developing countries the recent developments in plant sciences, there has been a great increase in the use of plant based health products. Around the globe about 70-80% people rely on medicinal plants [36]. There is vast demand for herbal products in global market. But India's share in global trade of Herbal and Medicinal plant is less than 1% [37]. The Indian Himalayan region (IHR) supports the sub-tropical, tropical, sub alpine vegetation and temperate it has a rich flora of aromatic and medicinal plants and so far 1748 species have been stated medicinally significant [18]. Medicinal plants are of excessive concern all over the Himalayan area, because they are important for traditional health care. Himalayan regions plants have vast market potential but due to overexploitation of medicinal plants and several other environmental and anthropogenic factors their growth is limited only to protected reserves and regions [15].

III. GEOGRAPHICAL DISTRIBUTION

T. govanianum is an endangered plant species from Himalayas. *T. govaninaum* is found in the vicinities of Himalayas especially in India, China, Nepal and Bhutan, found at an altitudinal of 2500–3800 m *T. govanianum*belonging to family Trilliaceae is an native medicinal plant of Himachal Pradesh, India. It is a trifoliate, robust, herbaceous plant species with deep green and red colored flower [31].

Classification (Sharma, 2017) [31]	
Kingdom	Plantae
Subkingdom	Tracheobionta
Super division	Spermatophyta
Division	Magnoliophyta
Class	Liliopsida
Subclass	Liliidae
Order	Liliales
Family	Liliaceae
Genus	*Trillium*
Species	*T. govanianum*

Fig. 1. Botanical study of the important medicinal plant Nagchatri (*Trillium govanianum* Wall ex D.Don) found in the Himalayan region.

T. govanianum is a small and perennial herb with creeping, rootstock thick, stem erect unbranched, deep oxblood red and green flower at the apex. Leaves acute, broadly ovate, and arranged in a whorl at the summit of stem with a solitary stalked flower in the centre. Flower brown- purple. *T. govanianum* seed ovoid, fruit globular, red berry 1-2 cm long.The underground part of rhizome is key material of trade containing Trillarin which on hydrolysis yield diosgenin and used in preparation of sex hormones and steroidal hormones [5].

Biodiversity has always made available various services to mankind. Amongst the several constituents of biodiversity, medicinal plants are well known as livelihood choice. *T. Govanianum* can be the best e.g. as this species is commercially exploited for livelihood by the inhabitants. During the current 2 to 3 years, from the wild increasing demand of this species has resulted in over-exploitation. The area does not have any certification standards and ends up losing hefty revenue. The native people are highly dependent on forest and forest resources for their livelihood, primarily the collection ofwild medicinal plant species. The native people are unaware about the use of the plant, the reason behind its rapid demand and the final destination of the raw material**.** The foremost significant thing is to make awareness and give training to native people about sustainable exploitation of medicinal plant wealth

in hillside management for plant resources. In tribal areas there is urgent need to encourage its large-scale cultivation. The government should raise nurseries and make available plant material to native people. It will not only benefit in its conservation, but also increase their source of income (Sharma 2017) [31].

***Trillium* species:** *Trillium*s have several species, known and main species of this plant are written below. *Talbidum*, *T. angustipetalum*, *T. apetalon*,*T. camschatcense*, *T. catesbaei*, *T. cernuum*, *T.channellii*, *T. chloropetalum*, *T. crockerianum*, *T. cuneatum*, *T. decipiens*, *T. decumbens*, *T. discolor*, *T. erectum*, *T. flexipes*, *T. foetidissimum*, *T. govanianum*, *T. gracile*, *T. grandiflorum*, *T. hagae*, *T. komarovii*, *T. kurabayashii*, *T. lancifolium*, *T. ludovicianum*, *T. luteum*, *T. maculatum*, *T. miyabeanum*, *T. nivale*, *T. oostingii*, *T. ovatum*, *T. persistens*, *T. petiolatum*, *T. pusillum*, *T. recurvatum*, *T. reliquum*, *T. rugelii*, *T. sessile*, *T. simile*, *T. smallii*, *T. stamineum*, *T. sulcatum*, *T. taiwanense*,*T. tschonoskii*, *T. underwoodii*, *T. undulatum*, *T. vaseyi*, *T. viride*, *T. Viridescens* and *T. yezoense* (Sharma and Parashar 2017) [34].

Dried roots of *Trillium* species that are used traditionally for immune regulation and also as ananti-ageing agent, and anti-inflammatory. Cytotoxicity belongings of roots of several species of *Trillium* can be used against lungs, liver, breastcarcinoma cells. *Trillium* Genus is rich in steroidal Saponins, e.g. *T. erectum, T. kamtschaticumpall, T. Tschonoskiimaxim* [44].

IV. PHYSICOCHEMICAL PARAMETERS

Total ash value in the rhizome of *T. Govanianum* is 12.5 percent, water soluble ash 4.0 percent, acid soluble ash 2.4 percent and acid insoluble ash 0.8 percent w/w. Extractive values are high for solvents like methanol (18.75%) and water (21.5%) as compare to non-polar solvents, which is an indicative of abundance of sugars, and other polar compounds like saponins, glycosides, flavonoids and steroids. In *T. govanianum* ash value in the rhizomeis 12.5%, water soluble ash 0.4%, and acid soluble ash 2.4%. Extractive values are high for solvent like water (21.5%) and methanol (18.75%) as compare to non-polar solvents and it shows the abundance of sugars, and other polar compounds like saponins, glycosides, steroids and flavonoids.

V. PHYTOCHEMICAL ANALYSIS

The phytochemical tests on *T. Govanianum* rhizome shown the presence of secondary metabolites in methanolic extract and its fractions, such as steroidal saponins, glycosides, tannins, flavonoids and sterols. The rhizomes of *T. Govanianum* revealed the presence of secondary metabolites in methanolic extracts, such as tannins, glycosides, saponins, flavonoids and sterols [23, 24, 25].

Therapeutic uses: *T. govanianum*has anti-inflammatory activity, analgesic, anti-cancer activity, anti-fungal activity and anti-oxidant activity (Sharma, 2017) [31].

Analgesic and Anti-inflammatory activity: Therefore, the rhizomes of *Trillium* species could serve as potential novel source of compounds effective for inflammation and alleviating pain.

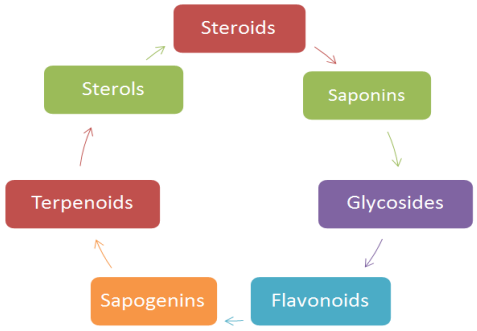

Fig. 2. Phytochemicals found in *Trillium govanianum.*

Antifungal activity: Three known compounds pennogenin, borassoside E, anddiosgenin were isolated from rhizomes of *T. govanianum.* Borassoside E and Govanoside A compounds exhibited good to modest activities against *A. flavus* ATCC 9643, *A. niger* ATCC 16888, *C. glabrata* ATCC 90030 and *C. albicans* ATCC 18804 [26].

Antioxidant activity: *T. govanianum* rhizomes exhibited the antioxidant activity. The antioxidant activity of the extract as well as its fractions was lesser than ascorbic acid and BHT. This less scavenging capacity of the extract or its fractions might be attributed to the presence of large sized fatty components [23].

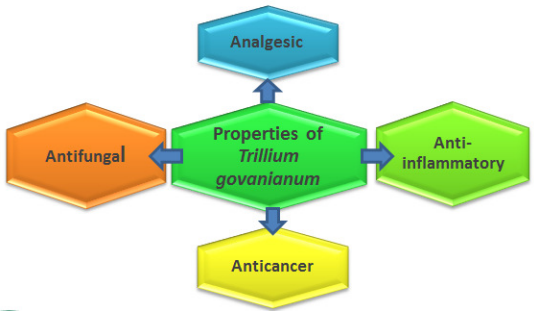

Fig. 3. Properties of *Trillium govanianum.*

Significance of *Trillium:* *Trillium* is a very significant plant. It is medicinal as well as herbal in nature. Its several parts like leaves and roots can be used for the treatment of dysentery and diarrhea, each part possesses medicinal property, so it is not at all wrong to say that *Trillium* is a magical herb with lots of properties. It is very long lived herb act as antiseptic, antitumor, anti-spasmodic, and diuretic as well as ophthalmic. Several species of *Trillium* like *erectum*and *T. tschonoskii* has cytotoxic action. So, it is possible that many other plants of this species may possess same activity. Due to this reason this plant and its other species can be studied further for several other activities. The primary and important therapeutic use of *Trillium* that is to stop bleeding or hemorrhages.So present study will help in the conservation as well as future study of this plant, as there is a long way to go to know more about this

important and precious medicinal as well as herbal plant.

The review of literature indicates that *T. Govanianum* Wall. Ex D. Don is widely distributed in the IHR between 2,500 to 4,000 m but in 2011, the population in the wild habitats of the species had gone down to a great extent due to the large scale exploitation [41].

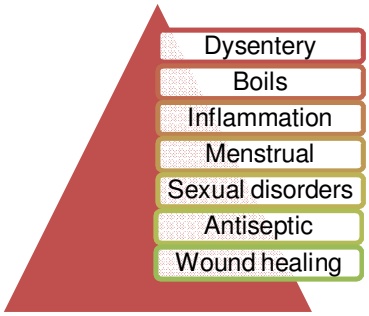

Fig. 4. Uses of Rhizome [21].

VI. DISCUSSION

The demand of this drug is high in the international markets due to its effective medicinal properties. The increasing demand of Naagchatri in the herbal industry a promising medicinal plant found in the temperate zone of the Himalayas is leading to its excessive exploitation. Over the last 6 months, huge amounts of the dried herb have been seized by the Forest Department. It has become a lucrative source of income for villagers. Continuous exploitation by poaching of this significant drug from its local surroundings of Himalayas is a matter of concerned worldwide concern in the near future. More appropriate techniques towards its conservation and ban on its exploitation from the Himalayas can conserve this rare herb Nagchatri. In Himachal Pradesh was notice that the local inhabitants were collecting Nagchatri in huge amount. There is a risk of its extinction as the plant is uprooted from the base.

VII. CONCLUSION

In western Himalaya *T. govanianum*is one of the most sought plant but we found that the pharmacological research are not complete of this plant.*T. govanianum* has anti-inflammatory, anticancer, analgesic and antifungal properties. To our surprise we don't found any literature regarding antibacterial, anthelmintic, antiviral, hepatoprotective activities of this plant. So pharmacological studies regarding various activities of this plant can be done.

Himachal Pradesh has varied atmospheric conditions due to altering altitude from east to west and from north to south. Wide differences in altitude, topography and climate conditions make this state a suitable habitat for variety of flora and fauna [4]. According to World Health Organization report 81 percent of the developing world depends on traditional medicines and of these, 85 percent use plants or plant extracts as the active component [35]. *T. govanianum* is an endangered medicinal plant used to curve different diseases like dysentery, diarrhoea, sexual, ulcerous wounds and menstrual disorders.

The practice of medicinal plants is a universal. Medicinal plants have ability to treat both non-infectious and infectious diseases. As back as the beginning of the human civilization use of plants and plant products as medicines could be traced. Wild plants used in traditional medicine contain a huge array of ingredients that can be used in the cure of ailments. Medicinal plants are good sources of pharmacological products and as a natural compound that acts as a new anti-infectiousagent [42].

Medicinal have the ability to create a huge number of organic phytochemicals. Sometime secondary metabolites (organic phytochemicals) are made by the plants for self-defence system [6]. A large number of secondary metabolites in the last 20 years have been reported from different-different plants for their antimicrobial action. The demands of plants based products have increased due to they are non-narcotic,natural products, easily biodegradable. They are easily available and have no side effects at reasonably costs [14].

In many researchinstitutes studies have undertaken on the traderecord of medicinal plants, which were foundremunerative and suitable for commercialcultivation [38].

Wild medicinal plants used by tribal people fromcenturies for efficacy, safety, lesser side effects and culturalacceptability. Medicinal plant products have utilized with varying successto prevent and cure diseases [19]. In the world market syntheticproducts have high side effect, so herbal products are gaining popularity [32]. Plants are one of the most important sources of medicines. Throughout the world medicinal plants are widelyusedin two distinct areas ofhealth management; modern system of medicine and traditional system of medicine.

The traditional medicine mainly functionsthrough two different streams:

(i) Codified and organizedIndian system of medicines like Ayurveda Siddhaand Unannietc

(ii) Local or folk or tribal stream [20].

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