

# Chemical constituents and medicinal properties of *Tinosporacordifolia*(giloy)

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## Abstract

Medicinal plants, because of their therapeutic value have been used by mankind since beginning of human civilization. Huge number of modern drugs has been isolated from medicinal plants. An impressive interest always exist in exploring bioceuticals from plant extracts to put back synthetic drugs because of their adverse effects and also for economic point of view. *Tinosporacordifolia* (Giloy) is a largely used shrub in folk and Ayurvedic system of medicine across India. *Tinospora cordifolia* is one of the most important medicinal plant frequently called 'Giloy' belonging to the menispermaceae family. The purpose of present review is to summarize the information concerning chemical constituents and medicinal properties of *Tinospora cordifolia* plant.

**Keywords:** - Medicinal plants, *Tinospora Cordifolia*, Bioceuticals, Alternative Medicine.

## 1. Introduction

About 80% of world population depends extensively on traditional medicines involving utilization of plant extracts or their bioactive components as stated by WHO. India with its mega biodiversity and information of rich ancient traditional system of medicine provide a strong platform for the exertion of numerous plants in general healthcare and mitigation of common illness of the people [1].

*Tinosporacordifolia* is known as by different name in different languages in India such as Tippa-teega (Telugu), Shindilakodi (Tamil), Amruthaballi (Kannada), Gurcha (Hindi), Amritavalli (Sanskrit), Guduchi (Marathi), Guluchi (Oriya) [2,3]. In Ayurvedic system of medicine, *Tinosporacordifolia* has a special place as an impressive adaptogen and aphrodisiac [4]. *Tinosporacordifolia* is well known Indian bitter and prescribed in fever, diabetes, dyspepsia, jaundice, urinary infection, skin diseases and chronic diarrhea. The ascending shrub has proven great potential for development of biopharmaceuticals products for the cure of numerous diseases.

## 2. Chemical Constituents of *Tinosporacordifolia*

Different class of chemical constituents viz, alkaloids, diterpenoids, lactones, glycosides, steroids, sesquiterpenoid, phenolics, aliphatic compounds and polysaccharides etc belongs to *Tinosporacordifolia*. The chemical constituents of *Tinosporacordifolia* with their highly bioactive compounds are listed in figure 1.

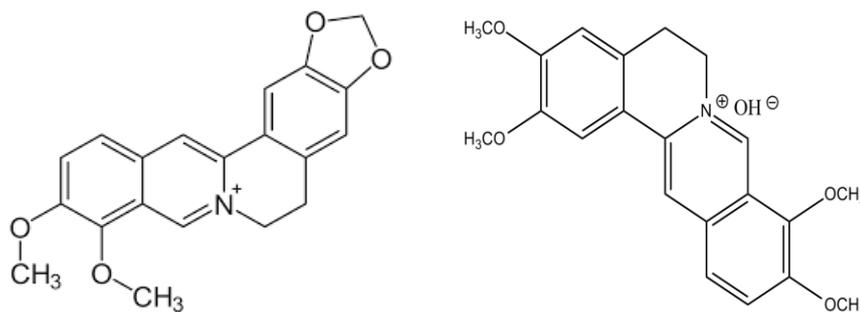


Figure-1 Berberine Plamantine

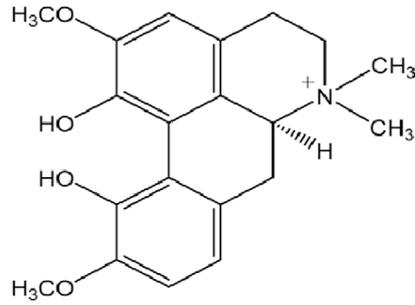
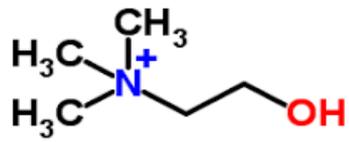


Figure-2 Choline Magnoflorine

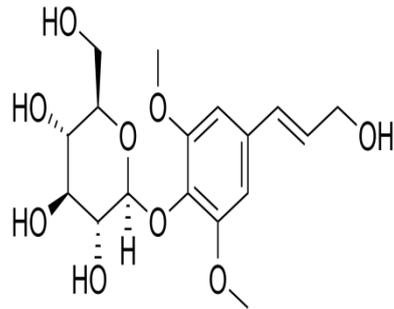
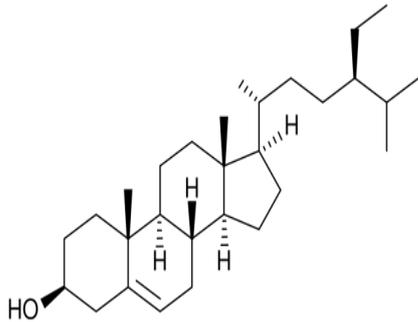


Figure-3 Beta- Sitosterol Syringin

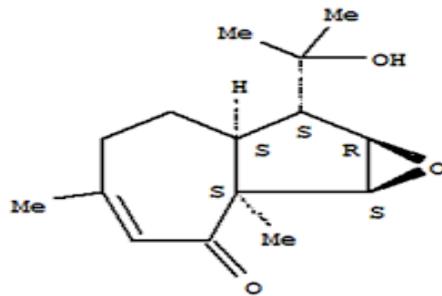


Figure-4 Octacosanol Tinocordifolin

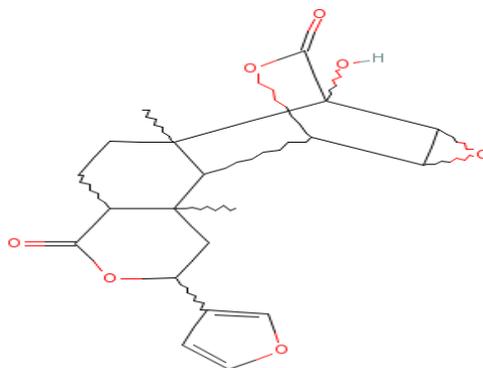


Figure-5 Tinosporides

Types of chemical constituents	Highly bio-active compounds	Parts to which belong
Alkaloids	Berberine ,Palmatine , Magnoflorine , Choline[5]. Tembetarine[6 ] .	Stem , Root
Glycosides	Syringin ,cardifolioside A [7] . Tinocordiside [8] .	Stem
Diterpenoid	Furanolactone [ 9]. Tinosporon[10] . Tinosporides [11].	Whole plant
Steroids	$\beta$ – Sitosterol [12] . Ecdysterone [13] .	Aerial Plant Stem
Aliphatic Compound	Octacosanol [14] . Heptacosanol [15] .	Whole Plant
Sesquiterpenoid	Tinocordifolin [16] .	Stem

### 3. Medicinal Properties of Tinosporacordifolia

Several bioactive compounds have been isolated from different parts of the Tinosporacordifoliaplant. These bioactive compounds have been reported to have impressive biological activity against numerous diseases.

#### 3.1 Anti-Diabetic Activity

Various phytochemicals viz, alkaloids, flavanoids and steroids which are isolated from extract of different parts of Tinosporacordifoliaplant have in vivo antidiabetic potential as reported by pharmacological studies [17]. Khannadhasan R and Venkataramans study reveals that 30 days treatment of sedimental extract of Tinosporacordifolia (1000 mg /kg ; p.o ) on diabetic body was proven for its effectiveness and transparently establishes the antidiabetic activity with antiobese body built [18]. The ethanolic extract of Tinosporacordifolialeaves in different dosage (200 and 400 mg/kg b. w) administered orally for 10 days and 30 days in streptozotocin diabetic albino rats. It its clearly proven that Tinosporacordifoliahas effective antidiabetic activity in diabetic animals and has an efficacy of 50% to 70% as compared to insulin [19]. The isoquinoline alkaloid rich fraction from stem including palmatine, jatrorrhizine and magnoflorine has been reported for insulin – mimicking and insulin releasing effect in vivo as well in vitro [20]. Oral treatment of Tinosporacordifolia (100 and 200 mg/ kg b.w) for 14 days mediates its anti – diabetic potential through mitigating oxidative stress, promoting insulin secretion and also by inhibiting gluconeogenesis and glycogenolysis [20].

#### 3.2 Anti – Cancer Activity

Anti –cancer activity of Tinosporacordifolia mostly reported in animal models. The extraction of alkaloid palmatine from Tinosporacordifolia by using response surface methodology clearly showed anticancer potential in 7,12 – dimethylbenzanthracene induced skin cancer model in mice [22] .Mishra R et al study reported the anti brain cancer potential of 50% ethanolic extract of Tinosporacordifolia using C6 glioma cells [22].

#### 3.3 Immuno Modulatory Activity

Bio – active compounds isolated from Tinosporacordifoliaviz, cordifolioside A , magnoflorine, tinocordiside and syringing has been reported to have potential immunomodulatory response [24]. Aqueous Tinosporacordifolia extracts have been reported to affect the cytokine production, mitogenicity, stimulation and activation of immune effector cells [25]. BhartiUmretia et al study showed that the concentrated form of aqueous extract of Tinosporacordifolia prepared by classically possessed effective immunostimulatory action on immune system [26]. It work as immunomodulatory in numerous diseases such as obstructive jaundice,hepatic fibrosis ,peritonitis and sepsis [27].

#### 3.4 Anti - Oxidant activity

Methanolic , ethanolic and water extracts of Tinosporacordifolia possessed significant antioxidant potential as compared to other solvents [28].Tinosporacordifoliahas the ability to scavenge free radicals. Alkaloids, a chemical constituents of Tinosporacordifolia has bioactive compounds viz, choline, tinosporin, palmatine ,tetrahydropalmatine and magnoflorine showed protection against aflatoxin- induced nephrotoxicity [29]. Nehaupadhyay et al study conclude that Tinosporacordifolia bark ethanolic extracts possess effective free radical scavenging activity as compared to methanol extracts [30]. Also the aqueous extract of Tinosporacordifolia root has anti- oxidant potential [31].

Besides of all of these, the chemical constituents of Tinosporacordifolia plant may apply as an impressive source of new therapeutic strategies for infectious diseases.

### 4. Conclusion

Tinosporacordifolia is one of the most non- controversial and extensively investigated herb in Ayurvedic medicine that achieve a special position as an effective adaptogen and aphrodisiac. Tinosporacordifolia has numerous useful phytochemicals, which are valuable in drug designing. Thereby wide investigation must be required to explore their therapeutic activity against combat diseases. Present review highlights the conventional antidiabetic , anti cancer, immunomodulatory and anti oxidant petition of Tinosporacordifolia as well its sacrosanct by fellow researches. Indeed, an

extensive research and development work should be performed on *Tinosporacordifolia* because of their adequate economic and therapeutic application.

### Conflict of Interest

In this manuscript the authors declare that there is no conflict of interest.

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