Tinospora cordifolia (Amrita)-A miracle herb and lifeline to many diseases

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Abstract: Medicinal plants have been used to cure human illness since time immemorial. Some of these drugs are believed to promote positive health and maintain organic resistance against infections by re-establishing body’s immune system and thus help in maintaining body equilibrium and conditioning of body tissues. Immuno-modulating and immune-potentiating agents have been reported to act primarily on cellular rather than humoral immune responses and to restore the aired host tissues without hyperstimulating the normals. It augments macrophage chemotaxis, phagocytosis and promotes interaction with other immunoregulatory lymphoid cells. Tinospora cordifolia (family Menispermaceae) is a large glabrous, deciduous climbing shrub typically growing in deciduous and dry forests. It is distributed throughout tropical Indian subcontinent ascending from Himalayas down to the southern part of Peninsular India at an altitude of 300 m asl. It is also reported in neighboring countries like Bangladesh, Pakistan and Sri Lanka. It is rightly called the magical herb due to its property of curing a lot of diseases. The present investigation provides evidences that support the ethnomedicinal properties of Tinospora cordifolia in the light of various researches.

Keywords: Tinospora cordifolia; magical herb; immuno-stimulant; chemotaxis.

Introduction

In Ayurveda Tinospora cordifolia (Thunb.) Miers also called as Amrita is used as “rasayana” which has powerful immunostimulant activity (Krishna et al. 2009). Charaka described rasayana as antiaging, which increased the life span, promoted intelligence, improved memory and ensured freedom from diseases, indicating immunostimulant effect (Kapil and Sharma 1997). T. cordifolia is one such plant that is used to strengthen the immune system of the body and keeping the function of its various organs in harmony. It has great potency to alleviate impurity of body organs. T. cordifolia (Gilo) in Vedic age (the golden time of Ayurveda) was considered as one of the most rejuvenating herbs working well on the entire seven Dhatus (the constituent elements of the body) keeping the bodies free from all types of illness (Singh et al. 2003). Scientists realize that the effective life span of any antibiotic is limited so new sources especially plant sources have to be investigated. Therefore, in today’s world of modern medicine T. cordifolia is rightly called as “The Magical Rejuvenating Herb”.

Current Status

During the last few decades considerable progress has been achieved regarding this plant biological activity and medicinal applications. Hence, it can be chosen as a source for the development of industrial products for treatment of various diseases. I have put an effort to compile available literature on research work done for this plant mainly on its therapeutic utility till recent.

Chemistry

A variety of constituents have been isolated from T. cordifolia and their structures were elucidated. They belong to different classes such as alkaloids, diterpenoid lactones, glycosides, steroids, sesquiterpenoid, phenolics, aliphatic compounds and polysaccharides. Leaves of this plant are rich in protein (11.2%) and are fairly rich in calcium and phosphorus (Singh et al. 2003). The presence of berberine, palmatine, tembetaline, magnoflorine, tinosporin, tinocordifolin (Bissett and Nwaiwu 1983; Kumar et al. 2000; Maurya et al. 1997; Pachley and Schleider 1981; Padhya 1986; Qudrat-I-Khuda et al. 1964)
from its stems, choline, isocolcubin, palmatine, tetrahydropal-matine, magnoflorine from its roots (Sarma et al. 1998), sitosterol, sirosterol and 2, 3, 14, 20, 22-25 hexahydroxyl-5-cholest-7-en-6-one from its aerial parts (Dixit and Kho-
sa 1971; Hanauman et al. 1986) and 18-
norclerodane, diterpene-O-glucoside from its stem wood (Khan et al. 1990) have been re-
ported.

Pharmacological studies

Rasayana herb *T. cordifolia* has been studied extensively for its adaptogenic activity. The whole and aqueous extracts are having signif-
ificant adaptogenic activity on a variety of biological, physical and chemical stressors on different animal models (Rege et al. 1999).

As Immunomodulator

According to recent reports by (Desai et al. 2009; Krishna et al. 2002) dry stem crude ex-
tract (DSCE) of *T. cordifolia* contained a poly-
clonal B cell mitogen, G1-4A which is polysac-
charide in nature (Sainis et al. 1997; Chintalwar et al. 1999). DSCE as well as G1-4A enhance
humoral immune response in mice and also pro-
tected them against lipopolysaccharide induced
endotoxic shock (Ramakrisnan 2001; Sainis et
al. 1999).

Anti-cancerous

In vivo administration of the TC extract to
mice bearing a spontaneous T cell lymphoma
(Dalton's lymphoma) has been found to prevent
tumor growth dependent regression of thymus and has been shown to upregulate antitumor ac-
tivity of tumor associated macrophages (Singh and Srivastava 2004; Singh et al. 2004; Singh et al. 2005). Jagetia et al. (1998) and Jagetia and
Rao (2006) reported a dose-dependent cytotoxic
effect of *Tinospora* extract in HeLa-cultured
cells comparable with doxorubicin. At low
doses, an ethanol extract of *Tinospora* increased
bone marrow cell counts, while higher doses
resulted in decreased counts in mice with
induced lymphoma.

Anti-HIV

Guduchi (TC) is being prescribed as a mono-
herbal as well as polyherbal formulation. The
polyherbal formulation possesses favorable ef-
fect in patients with HIV infection (Usha et al.
2003). Acquired immuno-deficiency syndrome
(AIDS) is a fatal illness caused by human im-
uno-deficiency virus (HIV), which breaks
down the host immune system, leaving the sub-
ject vulnerable to life-threatening opportunistic
infections, neurological disorders and malignan-
cies. Once infected, it is probable that a person
will be infected for life. In 2001, 40 million
people were living with HIV/AIDS worldwide,
prevalence rate was 1.2%, about 5 million be-
came infected and about 3 million died of it.
The main cause of immune defect in AIDS is
deficiency of the thymus-derived lymphocytes
(*T4*), characterized by the presence of CD4 sur-
face molecules, which are the cellular receptors
for HIV. Study conducted by Kalikar et al.
(2008) elaborated that *T. cordifolia* extract
(TCE), a plant derived immunostimulant, signi-
ficantly affected the symptoms of HIV. Accor-
ding to him TC could be used as an adjunct to
HIV/AIDS management.

Anti-Diabetic

Action of aqueous and ethanolic extract of
TC when administered to alloxan-induced
diabetic rats caused a dose-dependent reduction
in blood glucose levels, similar to glibenclamide
and insulin (Stanley et al. 1999; Waadood et al.
1992). Separate oral administration of an
aqueous root extract to an alloxan diabetic rat
caused a significant reduction in blood glucose
and brain lipids (Stanley et al. 2000), whereas
the ethanolic extract of the root produced
marked protective action against stress-induced
ulceration (Sarma et al. 1995).

Hepatoprotective

The plant especially its stem and leaves
showed considerable hepatoprotective activity
against toxicity induced by carbon tetrachloride
induced liver damage when administered on
mice as test system (Reddy et al. 1993; Kavitha
et al.2011). It helps in reducing the level of en-
zymes super oxide dismutase (SOD) and catalase and increasing the level of aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP), and acid phosphatase (ACP) (Sharma and Pandey 2010).

**Action on Parkinson disease**

Parkinson’s disease (PD) is the most common neurologically based movement disorder, clinically diagnosed by the presence of bradykinesia, postural instability, resting tremor and rigidity (Jason and Leonard 2004). PD occurs when a group of cells in an area of the brain called the substantia nigra (SN) begin to malfunction and die. These cells in the SN produce a chemical called dopamine. Dopamine is a neurotransmitter, or chemical messenger, that sends information to the parts of the brain that control movement and coordination. When a person has Parkinson’s disease, their dopamine-producing cells begin to die and the amount of dopamine produced in the brain decreases. As we enter the new century, Parkinson’s disease ranks among the most common late life neurodegenerative diseases, affecting approximately 1.5% to 2.0% of the population older than age 60 (Lonneke and Breteler 2006).

Studies conducted by Antony et al. (2010) elucidate amelioration of CNS toxicities of L-Dopa in experimental models of Parkinson’s disease by concurrent treatment with *T. cordifolia*. The gold standard drug for the treatment of Parkinson’s disease is L-DOPA, but various studies have proved that the treatment with L-DOPA leads to the death of surviving dopaminergic neurons in the CNS (Kedar et al. 1999). L-DOPA can generate free radicals during its own oxidation as well as during oxidative metabolism of its product, dopamine. Thus, it appears rational to propose that an excessive quantity of free radicals is generated, and this may be one of the factors which contribute to the various side-effects of L-DOPA. Their study resulted in counteracting the toxicities of L-DOPA therapy by co-administration of TC (one of the good antioxidant drug) crude powder that facilitate the actions and activities of mitochondrial complex-I which is an integral component in Parkinson’s disease (Kedar et al. 1999).

**Conclusion**

Every antibiotic has a certain life span regarding its efficacy and their prolonged usage is harmful in one or the other way. So scientists are more relying on natural products from medicinal plants to serve as alternate source of medicine for combating and alleviating various disorders in human beings and that too without any or much negative effect on a lower price.

Although extensive researches have been carried on medicinal aspects of *T. cordifolia* but still many aspects of this magical medicinal plant TC is unexplored like which male or female plant being more ethnopharmacologically better since it bears distinct male and female plants. Still there are many points unexplored in *Tinospora* like in pharmaceutical industry where whole plant is used for the preparation of various formulations without characterizing the potency of male and female plants separately. Hence there is a lot more potential in this plant to be tapped. It is hoped that this review will serve as an encouragement to all those involved in this field for its better economic and therapeutic utilization.

**References**


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Arom. Plants

Journal of Tinospora cordifolia (Tinospora cordifolia positive patients. 34 e-
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