IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, December 2022
Impact Factor: 6.252

Monograph Studies on Tinospora Cordifolia

Prathamesh Dinkar Dhokale, Mansvi Avinash Dhokale, Sayali Santosh Jadhav, Mrugasha Gurunath Desale, Dhomase Omkar Bhaskar, Bhalekar Sachin Mahadu
Samarth Institute of Pharmacy, Belhe, Pune, Maharashtra, India

Abstract: *Tinospora cordifolia is a deciduous woody climbing shrub distributed throughout India, China, Africa. It belongs to the family Menispermaceae. The pharmaceutical significance of this plant is mainly because of root, stem, leaf. It constitute various phytoactive compounds such as alkaloids, steroids, glycosides. lactones, polysaccharides and so on. Almost all parts of the plant constitute immunomodulatory properties. It is one of the important medicinal plant used in Ayurvedic medicine for the treatment of cold, fever, diabetes, and even rheumatoid arthritis .This paper presents a review on botanical description medicinal properties and pharmaceutical importance of Tinospora cordifolia.*

Keywords: Tinospora cordifolia, Medicinal plant, Immunomodulatory, Botanical description, Medicinal properties

I. INTRODUCTION

The World Health Organization (WHO) estimated that upto 80% of people still relay mainly on traditional remedies such as medicinal plants for their medicines. Since the beginning of human civilization, plants have been used as natural medicines. Recently, scientists are showing a great interest in the development of new drugs from traditional medicinal plants. India with its vast bio-diversity and huge knowledge of ancient traditional systems of medicine such as Ayurveda, Siddha, Unani, Amchiand provide a strong base for the utilization of a large number of plants in general healthcare and common ailments of the people.[1]

Among the vast library of important medicinal plants, Tinospora cordifolia (willd) is a deciduous climbing shrub which belongs to the family Menispermaceae. The plant family Menispermeaceae consists of about 70genus & 450 species that are found in tropical regions. It is found throughout the India & also in parts of SriLanka,Bangladeshand China. [2]The plant is designated as Rasayana in Ayurveda and is very well known for building up the immune system and body's defence against definite infecting Micro-organisms.[3,4]

Fig :3.Leaves of tinospora cordifolia .

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, December 2022
Impact Factor: 6.252

Fig:2. Stems of tinospora cordifolia

Fig: 1.Morphology of plant T.cordifolia

1.1 Toxonomic Classification

- Kingdom: Plantae – Plants
- Subkingdom: Tracheophyta –Vascular Plants;
- Super- division: Spermatophyta-Seed bearing plants;
- Division: Magnoliophyta-Flowering;
- Class: Magnoliopsia-Dicotiledons
- Subclass: Polypeptalae-Petals are free;
- Series: Thalamiflorae-Many stamens and flower hypogynous
- Order: Ranunculales
- Family: Menispermaceae-The Moonsee family
- Tribe: Tinosporeace
- Genus: Tinospora
- Species: Cordifolia

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, December 2022
Impact Factor: 6.252

1.2 Distribution

The plant is distributed throughout the tropical and subtropical regions of India. It is indigenous to areas of India, Sri Lanka, China, Myanmar, Thailand, Philippines, Indonesia ,Malaysia, Vietnam, Bangladesh and South Africa.[5,6]

1.3 Growth Requirement

The plant is very rigid and it can be grown in almost all climates but prefer climate. Planting is usually done during rainy season (July-August).[7] It can be successfully grown in all variety of soils. For cultivation purpose blackor red soil can prefer.

1.4 Botanical Description

Tinospora corifolia is a large, deciduous, extensively spreading and climbing shrub with several elongated twining branches. Different parts of exhibits different types of morphology which are described below.

A. Root

Roots are aerial, thread like, long filiform, threadlike, squairsh, which arise from the mature branches or cut bits of stems grow downward and by continuously lengthening sometimes reach the ground.[8] Microscopic observations of aerial roots are characterized by tetra to penta-arch primary structure. However, cortex of root is divided in to outer thick walled and inner parenchymatous zone .[9] The dried aerial roots are light grey –brown or creamy white in colour, odourless and bitter taste. Starch is present throughout the parenchyma of the aerial root.

B. Stem

Stem of this plant is rather succulent with long, filiform, fleshy and climbing in nature. Aerial roots arise from the branches.[10] Dried stem is cylindrical, slender, slightly twisted in shape. Outer bark is thin and papery which is brown to greyish in colour. The stem when sectioned transversely shows a wheel like structure. Lenticels are circular and prominent. The stem powder is creamish brown to dark brown in colour with characteristic odour and bitter taste.The stem is used in dyspepsia, fever and urinary diseases.[11]The starch obtained from the stem known as “Guduchi-satva” is highly nutritive and digestive and used for many diseases.

C. Leaves

Leaves of this plant are membranous, simple, alternate, with long petiole approximately 15cm which is round,[9,12,13,14]pulvinate, heart shaped, twisted partially and half way round. Leaves are seen in bulk intensely green in colour but over mature leaves are yellowish green to yellow colour. Leaves are bitter and have an indistinct odour. Lamina is ovatecordate, 1020 cm long, 8-15cm broad[13].Leaves are rich in protein, calcium and phosphorus.[15]

D. Flower

Flowers are small and unisexual which are greenish yellow in colour. Male flowers are clustered and female flowers exist in solitary. Sepals are six in two series of three each. Outer ones are smaller than the inner sepals. Petals are also six, smaller than sepals, free and membranous. Flowering is seen during summer (March to June) [5,12,13].

E. Fruit

Fruits are fleshy and single seeded which are aggregates of one to three. These are drupelets on thick stalk with a sub terminal style scars .The shape of the fruit is ovoid with smooth texture and Scarlet or orange red in colour .These appear during winter.[12,13]

F. Seed

Seeds are white, bean shaped and curved.[9 Embryo also turned in to curve shape automatically.[16]

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, December 2022
Impact Factor: 6.252

The major biological Properties of Tinospora cordifolia includes

Immunomodulatory Property

The immuomodulatory property of Tinospora cordifolia is well documented.[17-18] Active compounds 11-hydroxymustakone, N-methyl-2-pyrrolidone, N-formylannonain, cordifolioside A, magnoflorine, tinocordiside and syringin[19] has been reported to have potential immunomodulatory and cytotoxic effects.[17-18,20]They have been reported to function by boosting the phagocytic activity of macrophages, production of reactive oxygen species (ROS) in human neutrophil cells,[21] enhancement in nitric oxide (NO) production by stimulation of splenocytes and macrophages indicative of anti-tumor effects.[22]Aqueous Tinospora extracts has been also reported to influence thecytokine production, mitogenicity, stimulation and activation of immune effector cells.In mice, Tinospora cordifolia extracts has been shown to result in up-regulation of IL-6 cytokine, resulting in acute reactions to injury, inflammation, activation of cytotoxic T cells, and B cell differentiation.[23]

Anti- diabetes properties

The stem of Tinospora cordifolia is widely used in the therapy of diabetes by regulating the blood glucose[24] in traditional folk medicine of India. It has been reported to mediate its anti-diabetic potential through mitigating oxidative stress (OS), promoting insulin secretion and also by inhibiting gluconeogenesis and glycogenolysis, thereby regulating blood glucose.[24] Alkaloids, tannins, cardiac glycosides, flavonoids, saponins, and steroids as the major phytoconstituents[25] of Tinospora cordifolia have been reported to play an anti-diabetic role.

Anti- toxic effects

Tinospora cordifolia extracts have been reported to scavenge free radicals generated during aflatoxicosis.[26] It exhibited protective effects by lowering thiobarbituric acid reactive substances (TBARS) levels and enhancing the GSH, ascorbic acid, protein, and the activities of anti-oxidant enzymes viz., SOD, CAT, GPx, Glutathione S-transferase (GST) and glutathione reductase (GR) in kidney. Alkaloids such as a choline, tinosporin, isocolumbin, palmatine, tetrahydropalmatine, and magnoflorine from Tinospora cordifolia showed protection against aflatoxin-induced nephrotoxicity.[26] Tinospora cordifolia stem and leaves extract has shown hepatoprotective effect in Swiss albino male mice against lead nitrate induced toxicity.[27]

Anti- Cancer Effect

The anti-cancer effects of Tinospora cordifolia are mostly studied in animal models. TCE have been shown to have a radioprotective role by significantly increase in body weight, tissue weight, testes-body weight ratio and tubular diameter and inhibit the harmful effects of sub-lethal gamma radiation on testes in male Swiss albino mice. In pre-irradiating mice, TCE significantly affected radiation induced rise in lipid peroxidation and resulted in the decline of GSH concentration in testes.[28] Pre-treatment of HeLa cells by TCE have been shown to decrease the cell viability, increase LDH and decrease in GSH S-transferase activity.[29] Dihydrotestosterone (DHT) in TCE has been reported to stimulate the growth and proliferation of Human LNCaP cells (which are androgen-sensitive human prostate adenocarcinoma cells). Androgenic compounds in TCE act via androgen receptor.[30]

Antioxidants Activity

The anti-oxidant capacity of Tinospora cordifolia stem methanol extracts administered orally increased the erythrocytes membrane lipid peroxide and catalase activity. It also decreased the activities of SOD, GPx in alloxan-induced diabetic rats.[31,32,33] Tinosporacordifolia Willd.(Menispermaceae) extracts possess possible inhibitors of aldose reductase and anti-oxidant agents[34] thereby reducing chemotoxicity induced by free radicals.[35].

II. CONCLUSION

The present review focuses on the botanical description and medicinal importance of the plant Tinospora cordifolia. The plant, for its vast bio-diversity and traditional medicinal importance, it provides a new sight of challenging

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, December 2022
Impact Factor: 6.252

research for the scientists to isolate pharmacologically active and therapeutic components from the plant to treat several dreadful diseases.

III. ACKNOWLEDGMENTS

The authors express their sincere thanks to all the authors in reference list for support to this review article.

REFERENCES

[1]. MM. Pandey, S. Rastogi, AK. Rawat, " Indian herbal drug for general healthcare: An overview", Internet Journal of Alternative Medicine, 2008.

[2]. AV. Raghu, S.P. Geetha, G. Martin, I. Balachandran, PN. Ravindran, "In vitro clonal propagation through mature nodes of Tinospora cordifolia (Willd.) Hook. F. &Thoms.: An important ayurvedic medicinal plant", In Vitro Cellular & Developmental Biolology-Plant, 42 (6), 584-588, 2006.

[3]. Tirtha SS, "The Ayurveda Encyclopedia-Natural Secrets to Healing, Prevention and Longevity", 2007.

[4]. CP. Khare, Indian Medicinal Plants- An illustrated Dictionary, Springer Science and Business Media, 710, 2007.

[5]. K. Sinha, NP. Mishra, J.Singh, SPS. Khanuja, "Tinospora cordifolia(Guduchi), a reservoir plant for therapeutic application", Indian Journal of Traditional Knowledge, 3(3), 257-270, 2004.

[6]. Abhimanyu Sharma, Asmitha Gupta, Sakshi Singh AmlaBatra, "Tinospora cordifolia(Willd.) Hook. F. & Thomson - A plant with immense economic potential", Journal of Chemical and Pharmaceutical Research, 2(5), 327-333, 2010.

[7]. S. Chaudhari, N. Shaikh, "Gaduchi-the best ayurvedic herb", The Pharma Innovation Journal, 2(4), 97-102, 2013.

[8]. U. Spandana, S.L. Ali, T. Nirmala, M. Santhi, S.D. SipaiBabu , "A Review on Tinosporacordifolia", International Journal of Current Pharmaceutical Review and Research, 4(2), 61-68, 2013.

[9]. KN. Aiyer, M. Kolammal, Pharmacognosy of Ayuevedic Drugs, Series 1. 1st ed Trivendram, The centeral Research institute, 1963.

[10]. B. Bishayi, S. Roychowdhury, S. Ghosh, M. Sengupta, "Hepatoprotective and immunomodulatory properties of Tinospora cordifolia in ccl4 intoxicated mature albino rats",The Journal of Toxicological Sciences, 27 (3), 139-146, 2002.

[11]. KR. Kirtikar and BD. Basu, Indian Medicinal Plants. Second Edition, International Book Distributers, Dehradun, 2005.

[12]. S. Nasreen, R. Radha, N. Jayshree, B. Selvaraj, A. Rajendran, "Assessment of quality of Tinospora cordifolia (willd) miers pharmacognostical and phyto-physicochemical profile",International Journal of Comprehensive Pharmacy, 1(5), 1-4, 2010.

[13]. K. Raghunathan, KC. Cluneker, PV. Sharma, "Pharmacognostical studies on GuduchiTinospora cordifolia (Miers)", J Res Indian Med, 6:201, 1969.

[14]. Database on Medicinal Plants Used in Ayurveda, Vol. 3, CCRAS, Reprint, New Delhi, 2005.

[15]. S.S. Singh, S.C. Pandey, S. Srivastava, V.S. Gupta, B. Patro, A.C. Ghosh, "Chemistry andmedicinal properties of Tinospora cordifolia (Guduchi)", Indian Journal of Pharmacology, 35, 83-91, 2003.

[16]. Tripathi YB, Sharma M, Manickam M. Rubia 5 din, a new antioxidant from rubia cordifolia. Indian J Biochem Biophys. 1997;34:302–6.

[17]. Subramanian M, Chintalwar GJ, Chattopadhyay S. Antioxidant properties of a Tinospora cordifolia polysaccharide against iron-mediated lipid damage and gamma-ray induced protein damage. Redox Rep. 2002;7:137–43.

[18]. Sharma U, Bala M, Kumar N, Singh B, Munshi RK, Bhalerao S. Immunomodulatory active compounds from Tinospora cordifolia. J Ethnopharmacol. 2012;141:918–26.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, December 2022
Impact Factor: 6.252

[19]. Kapil A, Sharma S. Immunopotentiating compounds from Tinospora cordifolia. J Ethnopharmacol. 1997;58:89–95.

[20]. More P, Pai K. In vitro NADH-oxidase, NADPH-oxidase and myeloperoxidase activity of macrophages after Tinospora cordifolia (guduchi) treatment. Immunopharmacol Immunotoxicol. 2012;34:368–72.

[21]. Upadhyaya R, PR, Sharma V, Anita KV. Assessment of the multifaceted immunomodulatory potential of the aqueous extract of Tinospora cordifolia. Res J Chem Sci. 2011;1:71–9.

[22]. Sudhakaran DS, Srirekha P, Devasree LD, Premsingh S, Michael RD. Immunostimulatory effect of Tinospora cordifolia Miers leaf extract in Oreochromis mossambicus. Indian J Exp Biol. 2006;44:726–32.

[23]. Sangeetha MK, Raghavendran Balaji HR, Gayathri V, Vasanthi HR. Tinospora cordifolia attenuates oxidative stress and distorted carbohydrate metabolism in experimentally induced type 2 diabetes in rats. J Nat Med.

[24]. P S, Zinjarde SS, Bhargava SY, Kumar AR. Potent α-amylase inhibitory activity of Indian Ayurvedic medicinal plants. BMC Complement Altern Med. 2011;11:5.

[25]. Gupta R, Sharma V. Ameliorative effects of Tinospora cordifolia root extract on histopathological and biochemical changes induced by aflatoxin-b (1) in mice kidney. Toxicol Int. 2011;18:94–8.

[26]. Sharma V, Pandey D. Beneficial effects of Tinospora cordifolia on blood profiles in male mice exposed to lead. Toxicol Int. 2010;17:8–11.

[27]. Sharma P, Parmar J, Sharma P, Verma P, Goyal PK. Radiation-Induced Testicular Injury and Its Amelioration by Tinospora cordifolia (An Indian Medicinal Plant) Extract. Evid Based Complement Alternat Med.

[28]. Rao SK, Rao PS. Alteration in the radiosensitivity of HeLa cells by dichloromethane extract of guduchi (Tinospora cordifolia) Integr Cancer Ther. 2010;9:378–84.

[29]. Kapur P, Pereira BM, Wuttke W, Jarry H. Androgenic action of Tinospora cordifolia ethanolic extract in prostate cancer cell line LNCaP. Phytomedicine. 2009;16:679–82.

[30]. Prince Stanely Mainzen P, Menon VP. Hypoglycaemic and hypolipidaemic action of alcohol extract of Tinospora cordifolia roots in chemical induced diabetes in rats. Phytother Res. 2003;17:410–3.

[31]. Sivakumar V, Rajan MS. Antioxidant Effect of Tinospora cordifolia Extract in Alloxan-induced Diabetic Rats. Indian J Pharm Sci. 2010;72:795–8.

[32]. Prince Stanely Mainzen P, Menon VP. Antioxidant action of Tinospora cordifolia root extract in alloxan diabetic rats. Phytother Res. 2001;15:213–8.

[33]. Gacche RN, Dhole NA. Profile of aldose reductase inhibition, anti-cataract and free radical scavenging activity of selected medicinal plants: An attempt to standardize the botanicals for amelioration of diabetes complications. Food Chem Toxicol. 2011;49:1806–13.

[34]. Rawal A, Muddeshwar M, Biswas S. Effect of rubia cordifolia, Fagonia cretica linn, and Tinospora cordifolia on free radical generation and lipid peroxidation during oxygen-glucose deprivation in rat hippocampal slices. Biochem Biophys Res Commun. 2004;324:588–96.