



GILOY (*TINOSPORA CORDIFOLIA*): A MEDICINAL HERB FOR LIVESTOCK AND POULTRY

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ABSTRACT

Tinospora cordifolia possessing pharmacological properties is used for development of industrial products and in treatment of diseases. Phytoconstituents present are mainly responsible for different biological activities. In this review effect of feeding giloy in feed of ruminant and poultry has been discussed.

Key words:

giloy, pharmacological properties, poultry, ruminant

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INTRODUCTION

Tinospora cordifolia also known as giloy, guduchi, amrita or nectar is nowadays household medicine for humans and animals. This herb belongs to family of Menispermaceae and can be found growing and climbing on hedges, trees and building throughout tropical regions of India, Srilanka and Myanmar. It is perennial, large, glabrous and deciduous climbing shrub upto 300 metres having succulent papery, gray brown and watery bark, succulent stem, yellow axillary flowers with shortly stalked, subglobose drupes and pea-sized fruit. Mostly flowering starts in June with fruiting in November. Pharmaceutical properties are present in this plant so supplementation is done in powder or dried form in diet of animals with the intention of preventing diseases and improving quality of life. *Tinospora cordifolia* is used for treating fever^[1], weakness, dysentery, dyspepsia^[2], urinary infections^[3], secondary syphilis, gout^[4], impotency^[5], skin diseases, viral hepatitis^[6] and anemia^[7,8] along with rheumatoid arthritis, jaundice and diabetes^[9,10]. Different chemical constituents are present in this plant like alkaloids, terpenoids, lignans and steroids due to which different biological activities are noted.

Alkaloids: Tinosporine, tembetarine, magnoflorine and berberine are mostly found in giloy which impart properties like anticholinergic, antiarrhythmic, vasodilating, antitumor and antihypertensive. The bitter taste present in the leaves, stems, roots and barks is mainly due to alkaloids like berberine, gilonin and non glycoside gilonin, gilosterol.

pharmaceutical functions. Terpenoids are also mainly responsible for scent /flavor.

Lignans: In *Tinospora cordifolia* 3(alpha-4 dihydroxy-3 methoxybenzyl) and 4 hydroxy 3,3 methoxy benzyl are present.

Steroids: Giloinosterol, 20 alpha-hydroxy ecdysone and beta-sitosterol are present in giloy.

Different Biological Activities of *Tinospora Cordifolia*

Macrophage activation: Signalling molecule glucan(1,4)-alpha-D-glucan has immunostimulating property as it stimulates immune system through macrophages activation which occurs through TLR6 signalling, cytokine production and NF-Kappa B translocation^[11]. 2. Antineoplastic activity: When dichloromethane extract of guduchi was injected in mice with Ehrlich ascites carcinoma at 25,30,40,50 and 100mg/Kg, dose dependent elevation was noted in tumour-free survival. Dose of 50mg/Kg of giloy extract was found as optimum dose for neoplastic action. Upto 12 hours there was fall in glutathione activity which later increased.

Enhanced phagocytosis and antibody production. This property of giloy is used to prevent various diseases like steroid treatment, organ transplantation, immunosuppression, chemotherapy, HIV/AIDS, etc. When aqueous and ethanolic extracts of giloy were injected in sheep @10mg/Kg body weight for duration of 14 days, there was increased antibody production in red blood cells. Aqueous extract at 5 microgram/ml injection caused 200% increase in macrophages phagocytic ability. It stimulates immunity^[12], reticuloendothelial system, bone marrow cellularity, proliferation of stem cells and enhances the haemopoietic

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growth factor and IL-3. Significantly enhanced non-specific humoral and cell mediated immune response can also be stimulated by *Tinospora cordifolia* [13,14]. Pregnant crossbred periparturient Karan Fries cows supplemented with *Tinospora cordifolia* @ 60 g/day for 45 days prepartum and 120 g/day for 45 days postpartum resulted in higher total leukocyte, lymphocyte, neutrophil count along with increased neutrophil lymphocyte ratio [15].

Increase in memory and learning: Giloy is cognitive enhancer and potent immunomodulator for treatment of neurodegenerative diseases. This has been proved through research in which rats memory was corrected by aqueous and alcoholic extract supplementation after giving cyclosporine which is an immunosuppressant drug.

Effect on allergic rhinitis: Treatment of patients with extract of giloy decreases eosinophil and neutrophil count while goblet cells are absent. This herb can also be used for other forms of hypersensitivity.

Radio-protective potential: When mice was injected intraperitoneally (@200mg/Kg extract of giloy one hour before exposure to whole body gamma irradiation, 76.3% was survival rate (100% mortality in control) in treated mice group. After 10 days of post irradiation, increase in colony forming units (CFU) count and S-phase cell population was noted with increase in radiation doses 5GY, 7.5GY and 10 GY (decrease in CFU was noted in control). If pre-irradiation treatment, giloy extract is given, decrease in micronuclei is observed. This radio-protective manifestation of giloy extract can be of use in humans [16].

Immunomodulator in cell free system: Giloy showed inhibition in photosensitized induced oxidative damage and caused increase in thiobarbituric acid reactive substances in liver. Partially purified immunomodulator caused (a) inhibition in depletion in activities of catalase and superoxide dismutase in spleen/liver homogenate obtained from mouse (b) prevention of lipid peroxidation and restoration of activity of both enzymes [17]. In a trial effect of feeding giloy on white Pekin ducks affected by aflatoxicosis was studied [18]. Results indicated that giloy feeding (100g/liter water) for seven months removes hepatic lesions of aflatoxicosis and help the birds to increase body weight. When rat was treated with *Tinospora cordifolia*, an increase in the immunoglobulin level was recorded with significant increase in the white blood cell count and bone marrow cells which indicates a stimulatory effect on haemopoietic system [19]. When dried stem powder of *Tinospora cordifolia* (100 mg/ kg BW) was given to local non-descript cow by mixing it in concentrate mixture for a period of 5 days, *Tinospora cordifolia* feeding showed significant immunomodulatory effect [20].

Induction of enzymes of carcinogen/drug metabolism and anti-oxidant system in mice: Use of hydroalcoholic extract of giloy and distilled water (80:20) @ 50 and 100 mg/Kg body wt/day for 15 days at both doses increased levels of acid soluble sulfhydryl and cytochrome P content along with increase in activities of enzymes like Cytochrome P(450) reductase, GSH S-transferase (GST), Cytochrome b(5) reductase, DT-diaphorase (DTD), catalase, GSH reductase and GSH peroxidase. Ethanol extract of giloy has highest flavonoid and phenol content showing highest total anti-oxidant activity.

9. Cardioprotective action in ischemia-perfusion induced myocardial infarction: *T. cordifolia* ethanolic extract in rat reduced the infarct size while causing reduction in lipid peroxide levels of serum and heart tissues.

Anti-ulcer activity: Herbomineral preparation, Papticare (containing *T. cordifolia*) when given at various doses caused pylorous ligation, increase in pH of gastric juice and membrane bound enzymes like Ca²⁺ ATPase and Na+K+ATPase and decrease in total acidity.

Efficacy on blood profile: In diabetic rat, aqueous and alcoholic extracts of giloy @200 and 400 mg/Kg when administered orally for 10 days ameliorate derangements in lipid metabolism, increase high density lipoprotein cholesterol levels causing lowering of low density lipoprotein and very low density lipoprotein. While the extracts of the leaves of *Tinospora cordifolia* when fed to rabbit had insulin-like action and significantly reduced the blood glucose but not the total lipid levels in normal and in alloxan-induced diabetic rabbits [21,22,23]. *Tinospora cordifolia* extract in pekin ducks improved haemoglobin concentration and packed cell volume. *Tinospora cordifolia* feeding @4% of concentrate in crossbred calves increased haemoglobin, packed cell volume% and neutrophils% [24]. Administration of the extract of *Tinospora cordifolia* roots (2.5 and 5.0 g/kg body weight) for 6 weeks in alloxan diabetic rats resulted in a significant reduction in serum and tissue cholesterol, phospholipids and free fatty acids [25,26,27,28]. Alcoholic extract of *Tinospora cordifolia* (500mg/kg body weight, orally) in rats decreased the increased levels of serum creatinine, blood urea nitrogen and alkaline phosphatase in cisplatin induced nephrotoxicity resulting in the curative action against cisplatin-induced nephrotoxicity [29].

Increases feed intake and body weight gain: Increase in feed intake on supplementation of giloy has been noticed in Muzzafarnagri rams [30], buffaloes [31,32,33], black bengal goat [34], broiler chicks [35,36]. Inclusion of rumenotonic drug in which giloy was constituent in crossbred calves improved appetite, digestion, stimulated growth and improved rumen eco-system.

CONCLUSION

Tinospora cordifolia feeding is beneficial in animals. More research is needed to fully exploit the medicinal property of this plant for living organisms to be used on large scale.

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