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Review on Pharmacognostical Presentation of *Tribulus terrestris*

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Abstract: Across temperate, tropical, and desert climates worldwide, *Tribulus terrestris* L., an annual dicot species in the Zygophyllaceae family, is a common herb found in disturbed habitats and agricultural areas. An invasive species called *T. terrestris* has the potential to kill plant biodiversity, harm livestock, reduce the value of hay and wool, and discourage recreational users. The species has a tendency to spread like weeds, which could become an issue. At least 37 countries and 21 crops such as cotton, maize, vineyards, orchards, etc. have been affected by this weed. It is able to grow in various types of soil and adjust to a broad spectrum of environmental circumstances. *T. terrestris* can be managed by the application of herbicides, mechanical control (hand pulling, hoeing, mulching), and other techniques.

Keywords: Agriculture, Medical importance, IGF-I, Control, Herbicides, *Tribulus terrestris*

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Introduction

Tribulus terrestris L. is a herbaceous, monocarpic, annual broadleaf weed belonging to family Zygophyllaceae (Donalson and Rafferty, 2003). It can be found all across the world, from latitudes 35°S to 47°N (Holm *et al.*, 1991). *Tribulus terrestris* L. is found to be growing in subtropical areas around the world. It is commonly known as Gokhru, widely distributed throughout India. The fruits of *T. terrestris* L. have been used in traditional Chinese medicine for the treatment of eye trouble, edema, abdominal distention,

emission, morbid leucorrhoea, sexual dysfunction and veiling. Roots and fruits are useful in rheumatism, piles, renal and vesical calculi, menorrhagia, impotency, premature ejaculation, general weakness etc. It is a very potent diuretic and tonic drug (Selvam, 2008). Puncture vine (*Tribulus terrestris* L.) is medicinal plant which is used to stimulate masculine sexual desire (Ukani *et al.*, 1997). This review highlights the existing information on the origins, ingredients, qualities, and effect of *Tribulus terrestris* on female

reproduction (Chhatre *et al.*, 2014; Zhu *et al.*, 2017).

Mechanisms of Action:

Extract of *Tribulus terrestris* (TT) enhance the physical performance and muscle gain which arise due to the increase in plasma level of IGF-I and its receptor (Wu *et al.*, 2017). *Tribulus terrestris* has ability to alleviate muscle damage and to enhance anaerobic performance. It was associated with a decrease in plasma insulin-like growth factor binding protein-3 (IGFBP-3), but not in its target – IGF-I (Ma *et al.*, 2017). These reports indicate, that the Puncture vine enhance the physical performance by two ways – by reducing IGFBP-3, which inactivates the IGF-I and by increasing regulation of IGF-I receptors. The anti-inflammatory action of puncture vine can be mediated by prostaglandin. For example, addition of *Tribulus terrestris* to mouse macrophages inhibited their cyclooxygenase 2 (COX-2), an enzyme promoting prostaglandin E2, which is in turn involved in promotion of inflammation. It suggests that prostaglandin E can be a mediator of anti-inflammatory action of *Tribulus terrestris* (Hong *et al.*, 2002). *Tribulus terrestris* derivatives alkaloids can destroy cancer cells (Jurkat E6-1) via up-regulation of this transcription factor (Bassaiyye *et al.*, 2017).

Chemical Constituents:

There are almost 1.5 times as many main flavonoids as there are main saponins. This suggested that further research, development, and application of the flavonoid components in TT are necessary (Wu *et al.*, 1999) The chemistry and bioactivity of saponins in TT were investigated and discovered the presence of tigogenin, neotigogenin, gitogenin, hecogenin, neohecogenin, diosgenin, chlorogenin, ruscogenin, and sarsasapogenin kinds of furostanol and spirostanol saponins (Kostova and Dinchev, 2015). In addition, four tigogenin and diosgenin type sulfated saponins were identified. Protodioscin and protogracillin are among the furostanol glycosides that are prevalent, with

protodioscin being the most dominant saponin and spirostanol glycosides being present in smaller amounts (Xu *et al.*, 2010). The whole plant of TT was extracted in methanol, and the results of a gas chromatography-mass spectrometry analysis showed that the major constituent was -Amyrin, and there were seven other minor constituents present as well: 3,7,11,15-tetramethyl-2-hexadecen-1-ol, n-hexadecadienoic acid, hexadecadienoic acid ethyl ester, phytol, 9,12-octadecadienoic acid, 9,12,15-octadecatrienoic acid, and 1,2-benzene. Additionally, sterols such stigmasterols and -sitosterols were discovered to be present (Abirami and Rajendran, 2011)

Nutritional Supplement:

T. terrestris did not consistently affect testosterone levels in controlled studies. It has not been proven to be safe, and may negatively interact with prescription medications. Despite the fact that its extract has been used as a dietary supplement since the 1980s in the belief that it increases testosterone levels to aid body building or sexual enhancement in men, no advanced studies on *T. terrestris* extract have been done, and there are no reports that it possesses anabolic steroid effects for usage as a supplement for growing muscle or increasing sex (Pokrywka *et al.*, 2014).

Pharmacological activity:

Analgesic Effect:

Methanolic fruit extract has been reported to have analgesic properties. In comparison to Indomethacin, the extract was also found to have less stomach ulcerogenic activity (Heidari *et al.*, 2007).

Urolithiatic Activity:

Ethanollic extract of the fruits of *Tribulus terrestris* displayed significant dose dependent protection against uroliths induced by glass bead implantation in albino rats (Anand *et al.*, 1994).

Effect on Hypertension:

Decreased systolic blood pressure was reported with the treatment of lyophilized aqueous extract

of *Tribulus* fruits (Shainifi *et al.*, 2003). Gokshura ghana (solid aqueous extract) is reported to be used in mild to temperate hypertension (Murthy *et al.*, 2000). Methanolic extract of *Tribulus terrestris* showed anti-hyperlipidemic (hypolipidemic effect) (Tantawy and Hassanin, 2007). Saponins of *Tribulus terrestris* were found to significantly lower serum total cholesterol, low density lipoprotein cholesterol and liver total cholesterol, triglycerides in diet-induced hyperlipidemia in mice (Shudi *et al.*, 2003).

Traditional Uses:

Tribulus terrestris is utilised as a diuretic, lithotriptic, tonic, aphrodisiac, palliative, astringent, stomachic, antihypertensive, and aphrodisiac. The majority of genitourinary tract diseases can be effectively treated with the herb's dried fruit. It is an essential component of Gokshuradi Guggul, a potent Ayurvedic remedy used to eliminate urinary stones and maintain the genitourinary tract's healthy operation. Impotence, venereal illnesses, and sexual debility have all been treated with TT for millennia in Ayurveda. The herb is employed as a folk remedy for impotence in Bulgaria. The Ayurvedic Pharmacopoeia of India cites the root and fruit's cardiogenic characteristics in addition to all these uses. The fruits were used in traditional Chinese medicine to treat eye problems, edoema, stomach distension, emission, sexual dysfunction and morbid leukorrhoea. The Shern-Nong Pharmacopoeia, the first known pharmacological treatise in China, describes TT as a highly valuable medication for repairing the depressed liver and treating fullness in the chest, mastitis, flatulence, acute conjunctivitis, headaches, and vitiligo. TT is a diuretic, mild laxative, and general tonic in unani medicine (Khare, 2007).

References

Abirami P and Rajendran A. (2011) GC-MS analysis of *Tribulus terrestris* L. Asian J Plant Sci Res. 1:13-14.
Anand R, Patnaik GK, Kulshreshtha DK and Dhawan BN. (1994) Activity of certain fractions of *Tribulus terrestris* fruits against experimentally induced

urolithiasis in rats, Indian journal of experimental biology. Indian J Exp Biol 32(8): 548-552.
Basaiyye SS, Naoghare PK, Kanojiya S, Bafana A, Arrigo P, Krishna Murthi K and Sivanesan S. (2017) Molecular mechanism of apoptosis induction in Jurkat E6-1 cells by *Tribulus terrestris* alkaloids extract. J Tradit Complement Med. 8: 410-419.
Chhatre S, Nesari T, Somani G, Kanchan D and Sathaye S. (2014) Phytopharmacological overview of *Tribulus terrestris*. Pharmacogn Rev. 8: 45-51.
Donaldson S and Rafferty D. (2003) Identification and management of puncture vine (*Tribulus terrestris* L.). Nevada Cooperative Extension Fact Sheet FS-03-34.
Holm LG, Plunknett DL, Pancho JV and Herberger JP. (1991) The world's worst weeds: distribution and biology. Malabar, Krieger Publishing Company.
Hong CH, Hur SK, Oh OJ, Kim SS, Nam Ka and Lee SK. (2002) Evaluation of natural products on inhibition of inducible cyclooxygenase (COX-2) and nitric oxide synthase (iNOS) in cultured mouse macrophage cells. J Ethnopharmacol. 83: 153-159.
Heidari MR, Mehrabani M, Pardakhty A, Khazaeli P, Zahedi MJ and Yakhchali M. (2007) The analgesic effect of *Tribulus terrestris* extract and comparison of gastric ulcerogenicity of the extract with indomethacin in animal experiments. Annals New York Acad Sci. 1095: 418-427.
Kostova and Dinchev D. (2005) Saponins in *Tribulus terrestris* – chemistry and bioactivity. Phytochem Rev. 4: 111-137.
Khare CP. (2007) Indian Medicinal Plants—An Illustrated Dictionary. First Indian Reprint, Springer (India) Pvt. Ltd, New Delhi, pp. 717-718.
Ma Y, Guo Z and Wang X. (2017) *Tribulus terrestris* extracts alleviate muscle damage and promote anaerobic performance of trained male boxers and its mechanisms: Roles of androgen, IGF-1, and IGF binding protein-3. J Sport Health Sci. 6: 474-481.
Murthy AR, Dubey SD and Tripathi K. (2000) Anti-hypertensive effect of Gokshura (*Tribulus terrestris* Linn.): A clinical study. Anc Sci Life 19(3-4):139-145.
Pokrywka A, Obmiński Z, Malczewska-Lenczowska J, Fijałek Z, Turek-Lepa E and Grucza R. (2014) Insights into supplements with *Tribulus Terrestris* used by Athletes. J Hum Kinet. 41: 99-105.
Sharifi AM, Darabi R, and Akbarloo N. (2003) Study of antihypertensive mechanism of *Tribulus terrestris* in 2K1C hypertensive rats: role of tissue ACE activity. Life Sci. 73(23): 2963-2971.
Shudi C, Weijing Q, Xiufeng P, Bin S and Huang X. (2003) Effect of saponin from *Tribulus terrestris* on

- hyperlipidemia. J Chinese Med Material 26(5): 2003-2005.
- Selvam ABD. (2008) Inventory of vegetable crude drug samples housed in Botanical Survey of India, Howrah. Pharmacog Rev. 2(3): 61-94.
- Tantawy WH and Hassanin LA. (2007) Hypoglycemic and hypolipidemic effects of alcoholic extracts of *Tribulus alatus* in streptozotocin induced diabetic rats: A comparative study with *T. Terrestris*. Indian J Exp Biol. 45: 785-790.
- Ukani MD, Nanavati DD and Mehta NK. (1997) A review on the ayurvedic herb *Tribulus terrestris* L. Anc Sci Life 17: 144-150.
- Wu Y, Yang H and Wang X. (2017) The function of androgen/androgen receptor and insulin growth factor-1/insulin growth factor-1 receptor on the effects of *Tribulus terrestris* extracts in rats undergoing high intensity exercise. Mol Med Rep. 16: 2931-2938.
- Wu TS, Shi LS and Kuo SC. (1999) Alkaloids and other constituents from *Tribulus terrestris*. Phytochemistry 50:1411-1415.
- Xu YJ, Xu TH, Zhou HO, Li B, Xie SX and Si YS. (2010) Two new furostanol saponins from *Tribulus terrestris*. J Asian Nat Prod Res. 12: 349-354.
- Zhu W, Du Y, Meng H, Dong Y and Li L (2017) A review of traditional pharmacological uses, phytochemistry, and pharmacological activities of *Tribulus terrestris*. Chem Cent J. 11: 60.