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Review Article

Biological Potential of *Tribulus terrestris*

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ABSTRACT

Plants have a significant role in preserving human health and improving quality of life. gokshura (*Tribulus terrestris* Linn.) one of such plants, is mentioned in Ayurvedic texts for various therapeutic properties like balya(strengthening), brimhana (nutritive), rasayana(rejuvenator), mootrala(diuretic), shothahara(anti-inflammatory), vajikarana (aphrodisiac) etc. and useful in the management of mutrakrichhra (dysurea), ashmari (renal calculi) etc. It is a perennial plant, grown predominantly in India and Africa. Its extract contains alkaloids, saponins, resins, flavonoids and nitrates. As its therapeutic values, a review has been done to gather information on different aspects of gokshura. Further Ayurvedic references, the present paper also emphasizes on recent researches carried out on this plant for its pharmacological evaluation.

Keywords: *Tribulus terrestris*, Diuretic, Pharmacology

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Introduction:

Tribulus terrestris (gokshura) is a procumbent annual herb and belongs to Zygophyllaceae family.¹ It is native to southern Europe, Africa, temperate and tropical Asia.² *Tribulus terrestris* is developed to warm, moderate regions and is predominant in areas having hot summers and dry soils. In India, *Tribulus terrestris* is found primarily on loose and compact sandy loam soils, and reportedly grows on sand hills in the desert regions.³

Pharmacological Activity:

Aphrodisiac activity:

Gokshura is highlighted to be a vajikara dravya (aphrodisiac).⁴ Studies reported that, furastanolic type of saponin present in *T. terrestris* increases the amount of luteinizing hormone (LH), motivate spermatogenesis and results in motivation of Testosterone. These activities may help in civilizing the quality and quantity of sperm significantly.⁵ Furostanol saponin extract from *T. terrestris* shows positive effect on spermatogenesis of rams during breeding season with increase in count of spermatozooids, time of viability and sperm motility.⁶

Diuretic activity:

The plant is found to be helpful in diuresis. Potassium and rich amount of nitrates present in the plant may be responsible for this activity.⁷

Urolithiatic activity:

Ethanol extract of the fruits of *Tribulus terrestris* displayed significant dose dependent protection against uroliths induced by glass bead implantation in albino rats.⁸

Effect on hypertension:

Decreased systolic blood pressure was reported with the treatment of lyophilized aqueous extract of tribulus fruits.⁹ gokshura ghana (solid aqueous extract) is reported to be used in mild to temperate essential hypertension.¹⁰

Anti-hyperlipidemic effect:

Methanolic extract of *Tribulus terrestris* show hypolipidemic effect.¹¹ 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.¹²

Effect on diabetes mellitus:

Levels of malondialdehyde (MDA) and significant recovery of liver was found in treated rats.¹³ *T. terrestris* methanolic extract caused a significant decrease in blood glucose level and glycosylated haemoglobin.¹² In another study, methanolic extract of *T. terrestris* showed significant decrease in blood sugar level.⁷

Cardio-protective effect:

Hydro-alcoholic lyophilized extract of whole plant of *Tribulus terrestris* has been reported to have cardio-protective function. The fraction is reported to attenuate myocardial infarction in rats.¹⁴

Analgesic effect:

Methanolic extract of fruits reported to have analgesic activity. The extract also found to have smaller gastric ulcerogenic activity as compared to Indomethacin.¹⁵

Antispasmodic activity:

Significant decrease was found in peristaltic movement of sheep ureter and rabbit jejunum when treated with liophilized saponin extract of dried and powdered *Tribulus terrestris*.¹⁶

Anti-microbial activity:

Spirosponin, ethnolic extract of the fruit and leaves of *Tribulus terrestris* has activity against *E. coli* and *S. aureus*.¹⁷ Hexanoic and methanolic extracts of the plant showed significant activity against bacteria like *E. coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Proteus vulgaris* and *Staphylococcus aureus*.⁶ Tribulosin and sitosterol glycosides present in 50% methanolic extract of *T. terrestris* reported to possess anti-helminthic properties.¹⁷ Steroidal saponins from *T. terrestris* Linn. have antifungal action against fluconazole-resistant fungi (*Candida albicans*, *Candida glabrata*, *Candida parapsilosis*, *Candida tropicalis*, *Candida krusei*, and *Cryptococcus neoformans*).¹⁸

Cytotoxic effect:

T. terrestris of different regions (Bulgaria, China and India) and different parts of plants (stem and fruit) shows that only the spiro compounds exhibit remarkable activity. The inhibitory effect of saponin mixture from Chinese origin on Bcap37 breast cancer cell has potent inhibitory effect.¹⁹ In another study, data showed that *Tribulus terrestris* aqueous extract blocks proliferation and induces apoptosis in human liver cancer cells through the inhibition of NF_B signalling and can be used as an anticancer drug for hepato cellular carcinoma patients.²⁰ Total extract of the Bulgarian *T. terrestris* has a marked dose-dependent inhibitory effect on viability of breast cancer cells whereas saponin fraction has increased inhibitory effect compared to the total extract. Morphological changes and DNA fragmentation were observed as markers for early and late apoptosis in tumor cells after treatment. In the mechanisms of antitumor activity of *T. terrestris* apoptotic processes are involved. Apoptotic processes showed selective antitumor activity of Bulgarian *Tribulus terrestris* Linn. on human cancer cells in vitro.²¹

Wound healing action:

The leaves of *Tribulus terrestris* are used traditionally in folklore for the treatment of various kinds of wounds. Aqueous extract in carbopol at 2.5% and 5% concentrations showed significant reduction in period of epithelisation and wound contraction by 50% in excision and burn wound models. In the incision wound model a significant increase in the breaking strength was observed.²²

Nutritional values:

Tribulus terrestris is found to be rich source of calcium.²³

Contraindications:

Use of drug is contraindicated in dehydration²⁴ and pregnancy.²⁵

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