A REVIEW ON THE AYURVEDIC HERB TRIBULUS TERRESTRIS L.

M.D. UKANI, D.D. NANAVATI and N.K. MEHTA
BAN LABS Pvt. Ltd., Dr. Vikram Sarabhai Nagar, Gondal Road (South), Rajkot – 360 004, Gujarat.

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ABSTRACT: Gokshura (Tribulus Linn) of Family Zygophyllaceae is an indigenous plant which has been mentioned in Ayurveda with several clinical properties. The plant finds use in one form or the other in various ayurvedic preparations and this has been made it necessary to review the various studies carried out in its chemistry as well as pharmacology.

INTRODUCTION

Tribulus terrestris (L) (Family:- zygophyllaceae) is popularly know as Gokshura in Sanskrit. The Sanskrit literature on ayurveda describes many uses of the plant. Dwivedi (1) in Bhavaprakash nighantu in shloka No. 43, 44. states that:–

“gokshura: Sitala: Svadurvalakrdvastisodhana: madhuro, dipano vrsya: pustidascasmarihara: Pramehasvasakasarsa: Kracchra hrdroga vatanut.” (Bhavaprakasa:) (2)

It is sheetala, svadu, invigorating; useful in the treatment of urinary affection; madhura; gastric stimulant, aphrodisiac; nutritive; used in the treatment of urinary calculi, polyuria, dyspnœa; cough, piles dysuria, heart disease, pacifies deranged vata.

Our ancient rishis have described various medicinal properties of the herb. An attempt has, therefore, been made to study beneficial effects of the herb on human system and review the chemistry of Gokshura and establish relationship between medicinal properties and chemistry of the plant.

Habitat

Gokshura is found in waste land and dry habitats through the warmer region of India including west Rajasthan and Gujarat.

Botany

Gokshura is small prostrate, hirsute or silky hairy herb. Fruits are roundish, some what compressed., five cornered and covered with princkles of a lightish yellow colour. Seeds are several, oily and encoised in hard stony cells. They taste astringent and it is agreeable. The root when fresh is slender, fibrous, cylindrical and of a light brown colour. T. terrestris has two varieties (1) Mitha (sweet) and kadwa (bitter) Gokhru. Kadwa gokhru is bitter and mucilaginous, while the true gokhru is astringent and alternative.

Uses

One of the ten ingredients of Dashmula kwath consists of Gokshura. The leaves are useful in affection of urinary calculi. It is stomachic the stem is astringent. Its infusion is useful in gonorrhoea. The roots are aperients, demulcent and tonic.
Chemistry

Gheorghiu et.al (3) have reported presence of chlorgenin and gitogenin (1) with diosgenin(2).

Bhutani et. al(4) have reported kaempferol 3-glucoside, kaempferol 3 – rutinoside and tribuloside (4) from fruits and leaves of T. terrestris.

Kintya et al (5) have reported five diosgenin glycosides. One contained glucose arabinose, and rhamnose, two contained glucose and rhamnose and remaining two contained only glucose.

Tomova et al(6) have reported compesterol, β-sitosterol (5), stigmasterol (6) diosgenin (2) and neotigogenin from roots of T. terrestris. The same authors (7) have further reported a new saponin – terrestroside F- along with saponins C and G from aerial parts; saponin C and G proved to be mixture of two tigogenin and diosgenin glycosides each containing glucose rhamnose and astragalin.

Perpelista et. al (8) have reported trillin(7) gracillin(7) and dioscin (7).

Tomova et al (9) further reported hecogenin (8) from T. terrestris.

Gill et. al (10) have reported two alkaloids, Harman and harmol from the whole plant.

Two new steroidal glycosides neohecogenin glucoside and tribulosin (9) have been isolated from aerial parts of T. terrestris (11)

Ren et al (12) have reported a new derivative of cinnamic amide from tribulus terrestris, A new cinnamic amide derivative named terrestriamide and a known compound 7, Methylhydroindanone -1 have been reported by the same authors.

Pharmacology

The diuretic properties no doubt are due to the large quantities of the nitrates present as well as the essential oil which occurs in the seeds. (13)

Bose et al (14) in their experiments reported that the alkaloids fraction did not affect the blood pressure of dogs but depressed the frog heart in situ. It produced inhibition of acetylcholine induced contractions of the isolated intestine of rat and hd a moderate are diuretic effect. The diuretic action may be ascribed to the alkaloid fraction besides the potassium content.

The diuretic activity has been a subject of detailed study in both human beings and animals. In dogs, the fruit showed activity comparable to that of urea. But in the rats, the activity was less, the diuretic effect of the seeds as well as the aqueous extract of the ashes, obtained by burning the seeds, has been studied in albino rats; in isotonic solution. Their action was found to be comparable to that of potassium chloride. Besides the potassium content of the fruits, the diuretic effect has also been ascribed to the alkaloidal fraction present in the seeds. (15).

Tomova et, al (16) in their experiments obtained a preparation “Tribestan” has been obtained from Tribulus terrestris having a stimulating effect on sexual functions. The presence of the saponins protodioscine and protograciline has been confirmed via structural determinations. The preparation has been standardized on the basis of the predominating component protodioscine. Clinical trials in males manifested a stimulating effect on spermatogenesis. The
effect on females is manifested with improved overall activity and administration in cases of frigidity and sterility is advised.

Twaij et al.\(^{(17)}\) in their experiments with aqueous extract of the plant showed a molluscicidal activity at 50-100 ppm concentration against bulinus truncates.

Bowen et al.\(^{(18)}\) in their clinical observations on 406 cases of angina pectoris of coronary heart disease treated with saponin of \textit{T. terrestris} found that it dilated coronary artery and improved coronary circulation and thus proving better effects on improving ECG of myocardial ischemia.

**Diuretics**

Substances that increase the output of urine are called diuretics. The first factor in diuretics is glomerular filtration which is mainly determined by:

1. The rate of blood flow through the kidney substance.
2. Number of functioning renal units at a time.
3. Osmotic pressure of plasma proteins.
4. Hydrostatic pressure in the glomeruli.
5. Permeability of the filtering membrane.

As against these, the factor of tubular reabsorption which vitally affects the amount of glomerular filtrate and which would finally find its way to the pelvis of the kidney as urine.

\textit{T. terrestris} has potassium and fair amount of nitrates, and these two ions are very important in their function from the point of view of diuresis. The potassium ion is very quickly excreted by the kidneys. Being the chief-cation of the intracellular fluid, an excess in the plasma is treated as foreign low-threshold substance and hence is excreted rapidly. The nitrate ion is a low-threshold body and leads to diuresis. When the salt is given by mouth, the salt used is potassium nitrate 0.8-1Gm. Which is the best oral saline diuretic\(^{(19)}\)

**Identification**

In the Identification of crude drug, Pharmacognostic techniques are often used, but such techniques do not help us in assessing Ayurvedic preparations. In Ayurvedic pharmacy, when an Ayurvedic her is obtained from a market, it is very important that it is properly identified from the point of view of its chemistry. It is for the benefit of such units, some results of TLC have been reproduced. (see Fig 1)

The TLC study was carried out by parekh, Vora and Mehta \(^{(20)}\) and thin layer chromatogram (Fig 1) is presented in the text for the benefit of the phytochemists.
SOLVENT SYSTEM:-

Water + EtoH = Butanol + Acetone
[13] : [3] : [3]: [1]

Rf Value :- [1] Ø.83

* The spots were developed by exposing the plate to iodine vapour.

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