

PHARMACOGNOSTIC AND PHYTOCHEMICAL STUDY OF GOKSHURU – A REVIEW

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ABSTRACT

Ayurveda is an alternative medicinal science, practiced since ages in India. It considers nature and plants as the main reservoir of health. According to the *Dravyaguna* branch of *Ayurveda*, natural and pure form of medicinal plants can be used as drugs for treatment of various diseases. *Ayurveda* treaties have mentioned various medicinal plants and their benefits in promoting health. One such plant is *Gokshuru* which belong to the Zygophyllaceae family. It is an herb which is rich in *Snigdha Guna*, *Madhura Rasa Guru* and *Shita Virya* qualities. According to *Ayurvedic Acharyas* it has *Shothahara* (anti-inflammatory) as well as *Mutrala* (diuretic) properties. *Gokshuru* is used in treating various medical conditions such as kidney diseases, urinary discharges, *Vata prakopa*, etc. Many pharmacognostical and preliminary phytochemical studies have revealed that the roots are rich in alkaloids, steroids, tannins and fruits are rich in tannin, saponin, steroids, alkaloids and flavonoids. Due to the presence of many bioactive chemical compounds, *Gokshuru* is placed in the list of Indian pharmacopeia.

KEYWORDS: *Dravyaguna, Gokshuru, Acharyas, Madhura, Mutrala*, Pharmacognostical, Indian pharmacopeia.

INTRODUCTION

Gokshuru is a medicinal herb which is present in the list of *Dashmoola* drugs in the *Ayurvedic* treaties. Its scientific name is *Tribulus terrestris* belonging to the family of Zygophyllaceae.^[1] Various *Acharyas* described it as *Shvadansth*, *Mutrakrichchra*, *Rasayana*, *Asashkmarihara*, etc. Roots of *Gokshuru* are useful remedy for *Kasa*, *Sopha*, *Swasa* and *Jwara* while fruits of *Gokshuru* are beneficial in case of *Asmari*, *Mootrakrichra*, *Vrushya* etc.^[2-3]

Dravyaguna is an important branch of *Ayurveda* which deals with the drugs (herbo-metallic), their origin, properties, constituents, method of administration, their actions etc. It is very important for any physician to have proper knowledge of the drugs, medicinal herbs, and formulations before using them. *Ayurveda* is ancient medicinal system practiced since thousands of years, however our *Acharyas* at that time also, considered knowledge of *Dravyas* as mandatory to provide effective *Chikitsa* to the patient.^[4] Pharmacognosy is a part of pharmaceutical study which helps in assessment of purity and quality of the drug.^[5] Microscopic and macroscopic studies are carried out to enhance the purity, quality of drug and to prevent the drug from adulteration.

Gokshuru word is derived from a Sanskrit word “*Goksuraka*” meaning a fruit whose spikes causes injury to the grazing animal.^[4] They are found throughout the tropical India.

According to *Ayurvedic* scholars, *Dravyas* work on the basis of *Raspanchaka* (five principles),^[6] and *Gokshuru* work on following properties:-

- *Guna* (Properties) - *Singdha* (unctuous), *Guru* (heavy to digest).
- *Virya* (Properties) - *Sheeta* (cooling).
- *Rasa* (taste) - *Madhura* (sweet), *Tikta*.
- *Karma* (pharmacological action) - *Ashmarihara* (removes urinary stone), *Vastishodhana* (cures bladder ailments), *Vatanut* (pacifies vatadosha), *Vrusya* (aphrodisiac), *Rasayan* (rejunvinator), *Dipana*, *Shothahara*.
- *Rogagnata* – *Amlapitta*, *Arsha*, *Hridroga*, *Raktapitta*, *Shoola*, *Amavata*.
- *Vipaka* (taste after digestion based on activity) - *Madhura* (sweet).

Classification of *Gokshuru* according to *Ayurveda*^[7]

- *Charaka samhita* - *Anuvasanopaga*, *Mootravirechaniya*, *Krimighna*, *Madhuras kanda*, *Aasthapan*.

- *Sushruta samhita* – *Vidarigandhadi*, *Verratarvadi*, *Laghupanchmoola*, *Madhura varga*, *Kantaka-Panchamula*.
- *Astanga Hridaya* - *Veetarvadi*, *Madhuragana*, *Vataghna*.
- *Dhanavantari Nighantu* - *Guduchyadi varga*.

Mainly roots and flowers of *Gokshuru* are used for the medicinal purposes. It is called by various names in Sanskrit such as *Gokshuru*, *Kshuraka*, *Svadukantaka*, *Kantaphala*, *Gokantaka*, *Trikantaka* and *Bhukshura*.^[8] Some medicinal formulations of *Gokshuru* are mentioned in **figure 1**.

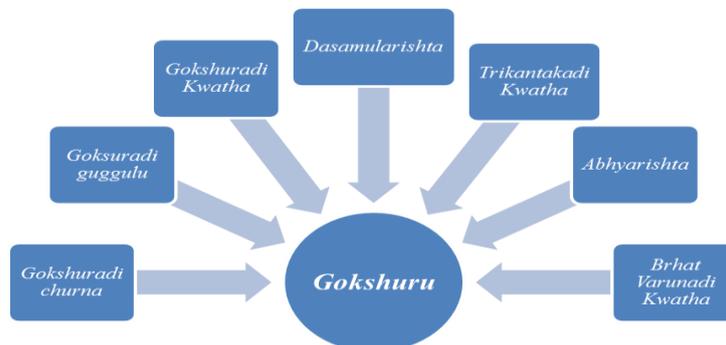


Figure 1: Medicinal formulations of *Gokshuru*.

Materials and Methods of study

For the study procedure, sample can be collected from the different land areas.

For macroscopic evaluation a magnifying lens was used. The surface characters and other observed macroscopic characters of the roots and fruits of *Gokshuru* (*Tribulus terrestris* Linn) were recorded. The *Ayurvedic Pharmacopoeia* of India has listed some standard procedures for evaluating the microscopic details.^[9] These standards are used for the histological evaluation and the drug is subjected to the powder microscopy.

According to *Ayurvedic Pharmacopoeia* of India (API), for preliminary Physicochemical and Phytochemical evaluation, various analyses should be carried out such as physical analysis, qualitative tests (mentioned in **figure 2**); elemental assessment, Thin Layer Chromatography etc.

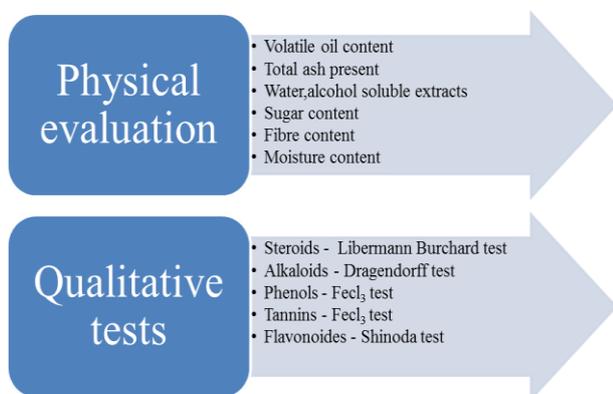


Figure 2: Physical and qualitative evaluation.

RESULTS

The roots of *Gokshuru* are cylindrical in shape and fruits have globose capsule with five cocci inside them. Both roots and fruits are yellow in color with astringent taste.

On microscopic evaluation, following things are noted

When transverse section of root is taken it was found to have circular outline. Cortex is made up of parenchymatous cells rich in rosette crystals of calcium oxalate and starch grains. Xylem component is wide in structure made up of scattered xylem vessels, parenchyma and thin walled fibers. Phloem comprises of sieve tissue, medullary rays, parenchyma and fibers.^[10]

Fruit is made up of epicarp, mesocarp, endocarp and endosperm. Epicarp contains trichomes and small tubular cells. Mesocarp and endocarp is rich in crystals of calcium oxalate. Endosperm of *Gokshuru* contains oil and starch grains.^[10]

Physico-chemical analysis

- Moisture content in roots is 9% and 10% in fruits.
- Percentage of total ash present in roots and fruits is 7.3% and 10.08%.
- Acid insoluble ash present in roots and fruits is 0.69% and 0.62%
- Water soluble extracts present in roots are 11.3% and in fruits are 10.9%
- Alcohol soluble extracts present in roots are 4.2% and 6.8% in fruit.
- Fibre content in roots is 46% and 38% in fruits.

Qualitative analysis

- Steroids (Libermann Burchard Test) are present in both roots and fruits.
- Alkaloids (Dragendorff Test) are present in both roots and fruits.
- Tannins are present in both roots and fruits.
- Phenol is absent in both roots and fruits.
- Flavonoids (Shinoda Test) are absent in roots and present in fruits.
- Saponins are absent in roots and present in fruits

Chromatography

Chromatographic assessment revealed that the best separation was achieved when Toluene-Ethyl acetate is used as a solvent system in a ratio of 8:1.

Elemental analysis

Atomic Absorption Spectroscopy (AAS) is done to detect the quantity of elements present. On evaluation of alcoholic and aqueous extracts, it was found that the elements present were lead, arsenic, cadmium and zinc. Their amount was quite less according to W.H.O. permissible limits and therefore these extracts can be considered safe for the human use.

Phyto-chemicals present in the *Gokshuru* plant

- Alkaloids – Tribulusin A, Tribulusamide C, Tribulusterine, etc.
- Amino-acids – Alanine and threonine.
- Saponins – Steroidal saponins, Spirostanol and Furostanol
- Flavonoids – Kaempferol, quercetin etc.

Conceptual view of *Gokshuru*

According to W.H.O., it is mandatory to control the purity and quality of drug and herbal formulation before using it for the health purposes. There are many criteria's suggested by the governments and associated departments for maintaining the standard of the formulation. One can evaluate most of the related things through macroscopic and microscopic assessments. Microscopic evaluation helps in assessing the substitute compounds and adulterants very clearly. Various tests such as macroscopic, microscopic evaluation; physicochemical evaluation, elemental evaluations are some ways to analyze the purity of the drug.

Mainly roots and fruits of *Gokshuru* are used for the medicinal purposes. Macroscopic assessment revealed the structure, shape, size, color, odor, taste properly. On microscopic evaluation, transverse section showed sieve tissue, parenchyma, small sized fibers and medullary rays, xylem embedded with prismatic crystals of calcium oxalate. The inorganic composition of any drug is determined by the ash values which were present more in fruit (10.08%) than roots (7.3%) of *Gokshuru*. The amount of active constituents is determined by estimation of extractive values. The preliminary phytochemical study of fruits showed the presence of steroids, tannin, alkaloids, saponin and flavonoids while roots showed only the presence of alkaloids, steroids and tannins.^[11] During elemental analysis, elements such as cadmium, zinc, lead and iron are found but within the limits set by W.H.O.

CONCLUSION

Pharmacognostic and phytochemical evaluations help in determining the purity and quality of a herbal drug. There are various criteria's set by the W.H.O., health departments to assess the purity of a drug; to make sure it

is free from adulterants and finally it is safe for medicinal purposes. *Gokshuru* is one among the ten drugs placed in the category of the *Dashamoola*. Mainly its fruits and roots are used for health benefits. It is rich in alkaloids, flavonoids, glycosides, steroids, phenols, and tannins. It provides immune-modulatory, anti-diabetic, aphrodisiac, hypolipidemic, cardiotoxic, hepatoprotective, anti-inflammatory, anticancer, antibacterial, anti-helminthes and anti-cariogenic effects to the body.^[12]

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