



PHARMACOGNOSTICAL AND PHYTO-CHEMICAL ANALYSIS OF YASTIMADHU-AN APPROACH FOR RAW DRUG STANDARDIZATION

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ABSTRACT

Yastimadhu (*Glycyrrhiza glabra* Linn) is an herbal material used in different compound formulations as well as single for treating various disease conditions. In the current study the used parts of *Yastimadhu* i.e. root is assessed for its pharmacognostical and Phyto-chemical findings. In the pharmacognostical study, the sample material is evaluated for both morphologically and microscopically, and observed for peculiar secondary growth in *Yastimadhu* (*Glycyrrhiza glabra* Linn) root with centrally present pith pigments, alternative bands of xylem and phloem, combined with medullary rays. These could be the finger print for the particular test sample. In Phyto-chemical study the presence of different organic materials like carbohydrate, proteins, tannins, glycosides, phenols are found whereas test for alkaloid presence is found negative. The data obtained are discussed critically to lay out the possible way of raw drug standardization for herbal material. Hope this scientific write up will be a step ahead for drug standardization in Ayurvedic system of treatment.

Keywords: -Pharmacognosy, *Yastimadhu*, alkaloids, Phyto-chemicals, *Mahakashaya*

INTRODUCTION:

Yastimadhu is a shrub having woody root and stolon, attaining a height up to 2m, leaves are multi-foliolate, flowers are arranged in auxiliary spikes. Pharmacologically it contains *Madhura rasa* (sweet taste) and *guru* (heavy); *snigdha* in its properties as well as *Madhura* and *Sheeta* in its *Vipaka* and *Virya* respectively.¹ It is extensively used in Ayurvedic medicines in its different dosage form like powder, decoction, tablet etc....for example *Yastimadhu ghanavati*, *Dhatri Avaleha* etc. In Charaka Samhita, it is the only herb, which is considered at 11 places out of 50 *Mahakashaya*², indicating its broad spectrum medicinal use in Ayurvedic treatment. Now a day it is also a subject of interest for the modern scientists due to its steroid contents and very proficient use in different autoimmune disorders³. Recently a Ghrita preparation containing yashtimadhu (yashtimadhu ghrita) have shown its efficacy in management of abhighataja vrana (traumatic wound)⁴. Due to its applicability in thousands of Ayurvedic formulations and its substantial use in Ayurvedic drug industry, adulteration of this highly potent material become very usual. In turn the quality of the medicine is dropped off. To protect the benefit of the consumer it is required that the medicines must be genuine for which the dignity of the raw material is obligatory.

For the authentication of the raw material, now a day's different physico-chemical parameters are used for its quality assessment. To establish the fingerprint of a particular herbal material, its pharmacognostical and phyto-chemical findings are the basic tools. These tools are also facilitating the raw drug (herbal) standardization a step ahead. Though the identifying and authenticating features of the study material i.e. *Yastimadhu* have been defined in the ancient texts with all its identifying formula and properties,⁵ but for facilitating the cross disciplinary debate and for global acceptance, honest efforts have been

made to assess it on the above said parameters and for establishing the data obtained.

MATERIALS AND METHOD:

The sample material i.e. *Yastimadhu* is assessed for its pharmacognostical and phyto-chemical values to establish the possible fingerprints for its authentication.

MATERIALS:

Following materials are required for pharmacognostical and phyto-chemical analysis.

DRUG:

Sample material i.e. water extract of *Yastimadhu*: – *Yastimadhu* is collected from authenticated shop in Jaipur market and water extract is prepared in the laboratory of Department of Dravyaguna, NIA (National Institute of Ayurveda).

APPARATUS/ EQUIPMENT:

Electronic Microscope, Petri-dish, Slides with Cover slip, Microtome, Butter paper, Filter paper, Crucible, Electric Muffle Furnace, Distillation apparatus, Beaker (200ml, 500ml), Test tube, Burette and Pipette.

CHEMICALS:

Sulphuric acid (H₂SO₄), Hydrochloric acid (HCL), Potassium Iodide (KI), Mayer's reagent, Dragendorff's reagent, Ferric chloride (FeCl₃), Sodium hydroxide (NaOH), Ninhydrin solution, alcoholic KOH, Molisch's reagent and Vanillin solution.

METHOD:-

Pharmacognostical study of *Yastimadhu*

Pharmacognosy is the study of physical, chemical, bio-chemical and biological properties of drugs and drug substances of natural origin⁶. This study is performed in two steps i.e. firstly identification and preparation of the sample and in second step microscopically examination of the sample.

Identification and preparation of the sample:

The sample is identified as *Yastimadhu* (*Glycyrrhiza glabra*, Linn.) by the expert committee for drug identification of NIA (National Institute of Ayurveda), Jaipur, following the API (Ayurvedic Pharmacopoeia of India) guidelines, is considered for study. Root, the used part of the plant is considered for study sample.

Sample is taken and some fine transverse sections are prepared with microtome and were kept in petri-dish containing water. Then, the most possible uniformly fine section is chosen, kept on a clean and dry slide and drop of glycerine is

added to it. Then it is covered with the cover slip and taken for microscopic analysis.

Analysis of Sample (*Yastimadhu* root):

Root of the plant *Yastimadhu* is subjected to macroscopic (organoleptic) and microscopic identification for establishing the data in following scientific method-.

Macroscopic identification: -

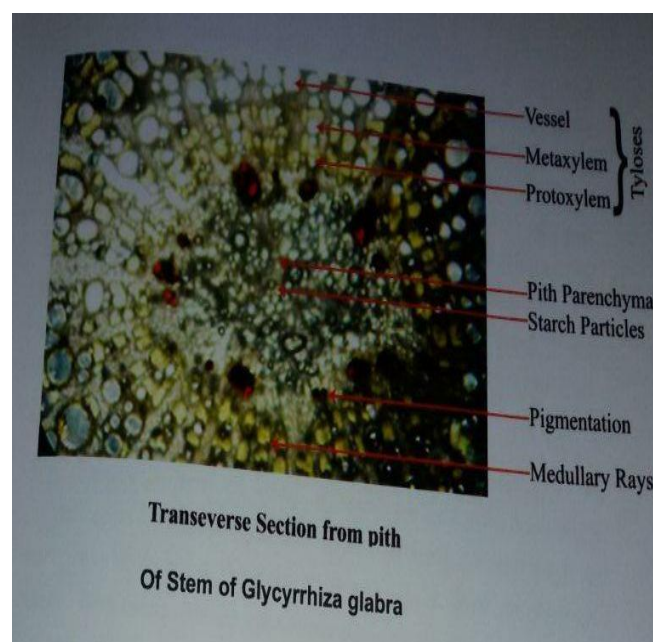
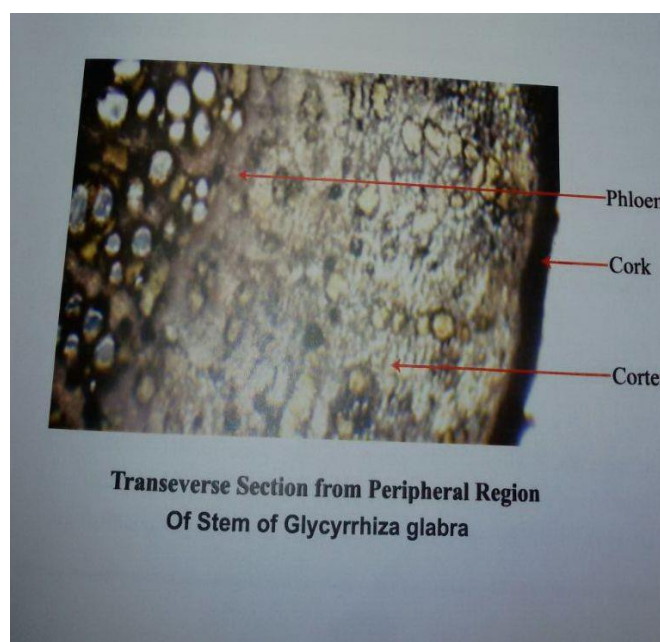
Freshly collected root of the said plant is taken, washed carefully to remove the mud and sand materials, air dried and naked eye observations are noted.

MACROSCOPIC OBSERVATION

Table No-1

| Sl. No. | Observation criteria | Observation |
|---------|------------------------------|--|
| 1. | Normal Size of sample (root) | 4-5 inches long and 2 inch in diameter |
| 2. | Colour | Dark Brown externally and pale yellow internally |
| 3. | Taste | Sweet |
| 4. | Odour | Peculiar sweet odour on macerating. |
| 5. | Texture | Fibrous appearance on cutting the sample |

MICROSCOPIC IDENTIFICATION-



Slide prepared with transverse section of root is kept under the electronic microscope and following findings are observed while watching the sample by moving the slide backward and forward and focusing at different places.

- The transverse section shows that the periderm consists of cork, cork cambium and secondary cortex. Periderm followed by cortex, is 3-4 layered and parenchymatous in nature.
- Cork tissue is composed of dead rectangular cells arranged in numerous rows.
- Wood is alternative plates of xylem, combined with medullary rays in uniform band, forming wood part.
- Numerous patches of xylem and phloem are arranged alternately in vascular bundles and xylems consist of protoxylem & meta-xylem and the vessels are filled with tyloses.
- Phloem contains sieve tubes and is arranged in alternating manner along with medullary rays. Pith pigments are present in central region & parenchyma contains starch particles.

PHYTO-CHEMICAL ANALYSIS OF YASTIMADHU ROOT:

Phyto-chemicals are the chemical substances present in the plant materials responsible for the colour and organoleptic features of the material⁷. For preparing the fingerprint of the sample selected, the phyto-chemical analysis is also performed along with pharmacognostical analysis. For the phyto-chemical analysis the aqueous extract of the sample is taken and analysis for different phytochemicals is performed with the use of suitable reagents and following the standard procedure for analysis of organic materials.

Carbohydrates and starch⁸:

2 ml of the aqueous extract of the sample is taken in a test tube and 2 ml of the Molisch's reagent is added, shaken carefully, followed by pouring of 1 ml. of conc. H₂SO₄ from side of the test tube slowly. After some time a red brown ring at the junction of the two layers is observed, indicating the presence

of carbohydrate. Appearance of blue-black colour on mixing of Iodine solution with the aqueous solution of the sample confirms the presence of starch.

Alkaloids⁹:

Aqueous solution of the sample does not give white or pale yellow colour precipitation with Mayer's reagent indicating absent of alkaloids of the purine groups and few others. Also non-appearance of orange colour precipitation in Dragendorff's reagent is indicating absent of alkaloids.

Proteins¹⁰:

Addition of alcoholic solution of Ninhydrin caused the formation of violet colour, confirming presence of proteins in the sample.

Tannins¹¹:

Aqueous extract of the drug is treated with Vanillin HCl Alcohol reagent (Vanillin 1gm + 10 ml conc. HCl +10 ml Alcohol) and brick red colour is formed indicating the presence of tannin.

Glycoside¹²:

To an aqueous extract of the sample Glacial Acetic Acid, a few drops of FeCl₃ and conc. H₂SO₄ are added. A reddish brown colour at the junction of two layers and changing of the upper layer into Bluish Green indicated presence of Glycoside.

Phenols¹³:

2 ml of aqueous extract of *Yastimadhu* is taken in a test tube and 2 ml of FeCl₃ solution is added. Blue to Deep Green colour of the solution is suggestive to presence of Phenols.

Steroids¹⁴:

2 ml of aqueous and alcoholic extract are refluxed separately with solution of alcoholic KOH till complete saponification process takes place. The saponification mixture is then diluted with distilled water and extracted with ether. The ethereal extract thus obtained is evaporated and residue is evaporated and the residue is subjected to Liebermann burchard's test.

Observation of phyto-chemical analysis of aqueous extract of *Yastimadhu* root
Table No.2

| S. No. | Chemical Constituent | Test Applied | Result (Root) |
|--------|----------------------|----------------------------|---------------|
| 1. | Carbohydrates | Molisch's reagent | + |
| 2. | Tannin | Vanillin solution | + |
| 3. | Protein | Ninhydrin solution | + |
| 4. | Phenol | FeCl ₃ solution | + |
| 5. | Glycoside | Keller Killiani test | + |
| 6. | Steroid | Liebermann Burchard,s test | + |
| 7. | Alkaloids | Dragendorff's reagent | - |

DISCUSSION-

Yastimadhu is a potent drug used in Ayurvedic healing having broad spectrum application in therapeutics. In this analytical study it is tried to establish the pharmacognostical and phyto-chemical findings of *Yastimadhu* to identify the raw sample for the preparation of different genuine Ayurvedic medicines and develop the fingerprint for the crude *Yastimadhu*. The sample drug contains glycosides, carbohydrates, proteins, tannins and phenols. Alkaloids are not found in *Yastimadhu* root. The colour of the sample, reddish brown externally and pale yellow internally, may be due to glycosides present in it and the taste may be due to carbohydrate and tannins. Due to presence of tannins a little bitter taste is observed along with more sweet taste, in oral route administration. In microscopic study it is found that 3-4 layered periderm followed by cortex, and parenchymatous in nature along with pith pigments are present in central region & parenchyma containing starch particles are the typical identification of *Yastimadhu* root. Alternative arrangements of xylem and phloem, combined with medullary rays in uniform band, consisting of protoxylem & metaxylem is also suggesting the sample as *Yastimadhu* root.

CONCLUSION: -

In current era to find out the quality and standard raw material is a challenge to the manufacturer for traditional system. As *Yastimadhu* root is used in many formulations or a single drug for treating different diseases, in current scientific study it is tried to establish

the crude *Yastimadhu* root in terms of its phytochemical and pharmacognostical findings. It is concluded that the *Yastimadhu* root does not contains any alkaloid and rich in glycosides and carbohydrates with little amount of tannins. Also it is inferred that 3-4 layered periderm, parenchymatous in nature, centrally present pith pigments with alternative bands of xylem and phloem, combined with medullary rays found in microscopically are the pharmacognostical fingerprint of the *Yastimadhu* root.

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