PHARMACOGNOSTICAL AND PHYTOCHEMICAL INVESTIGATIONS OF GREWIA HIRSUTA VAHL. ROOT.

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ABSTRACT

Grewia hirsuta Vahl. belongs to family Malvaceae is considered as one of the Nagbala species by Ayurvedic Scholars. Nagbala is single drug Rasayana mentioned in Ayurveda useful in treatment of various diseases like Tuberculosis, Respiratory disorders etc. Aim of this study is scientific evaluation of Grewia hirsuta Vahl. Root by pharmacognostical and phytochemical analysis. The present investigation reveals standardization of Nagbala (Grewia hirsuta Vahl.) Root(Mool) Churna (Powder) and Kwath (Decoction) which includes determination of moisture content, total ash, acid insoluble ash, water soluble ash, T.L.C., pH value, Refractive value, viscosity and also microscopic study of root. The study reveals presence of certain chemical constituents such as flavonoids, glycosides, carbohydrates. TLC also performed for the separation of components.

KEYWORDS: Root of Grewia hirsuta Vahl, Pharmacognostical and Phytochemical investigation, Nagbala.

INTRODUCTION

Grewia hirsuta Vahl. is an undershrub, 1-3m tall, erect, fulvous hairy, belongs to family Malvaceae, which is distributed through Sub Himalayan tract upto 4500 h. Common through deciduous forests, is widely used medicinal plant. The genus Grewia hirsuta Vahl. belongs to the division Magnoliophyta, class Magnoliopsida, Order Malvales And family Malvaceae.\(^{[1,2]}\)
**Grewia hirsuta** Vahl. is considered as one of the Nagbala species by Balwant Singh Thakur, Acharya Priyavratji Sharma which is commonly known as Gangeruki. The other 2 species are *Sida spinosa, Sida humili* Cav. Which are also taken as a Nagbala.\(^{[3,4]}\)

Nagbala is a single drug Rasayana mentioned in all Ayurvedic texts. Nagbala is useful in maintaining the health and treatment of various diseases. For this purpose, Nagbala Mool Churna and Kwath is mentioned. So, Nagbala Mool Churna and Nagbala Mool Kwath is subjected to study for the pharmacognostical and preliminary phytochemical analysis.

It is the need of era to provide standards for every Ayurvedic drug and to assess the standard qualities of marketed products. The evaluation of quality is found to be essential that can be the base for further research for the single drug or a drug formulation. To avoid the dilemma from the selection of raw drug to final manufacture, every process is of great importance. These new techniques will definitly be useful to improve the quality, purity, efficacy and safety of the drug that is more essential need today.

Quality standards of root of *Grewia hirsuta* Vahl. was not available in Ayurvedic Pharmacopia. Pharmacognostical and phytochemical study regarding root of *Grewia hirsuta* Vahl. was not found. Therefore, present study was conducted to investigate the pharmacognostical and phytochemical parameters of root of *Grewia hirsuta* Vahl.

**MATERIALS AND METHOD**

**Collection and authentication**

Roots of plant *Grewia hirsuta* Vahl. were collected from forests of Chikhaldara. Healthy, strong, matured, non-infected roots of plant were collected.

Authentification of plant was done at Agharkar institute Pune. Voucher No.- 15-223.

**Drying of drugs** – (Fig 2)

Roots were shed dried for 15-20 days.

**Storage of drug**

The roots were packed in air tight plastic bags after complete drying to avoid contamination. Plastic bags were kept at cool and dry place to preserve its shelf life.
Preparation Of Dosage forms
Mool Choorna and Kwath are two dosage forms were used for the laboratory investigations. Preparation of Choorna and Kwath of roots of Nagbala (*Grewia hirsuta* Vahl) was done as per Ayurvedic standard method.[5]

**Mool Churna Preperation (Fig 4)** - 80 mesh size of powder was prepared by using grinder.

**Mool Kwath Preperation (Fig 5)** - Coarse powder of roots was prepared first. Then Decoction was prepared by using 1 part of coarse powder of drug and 16 parts of water; which was boiled and reduced to 2 parts. These remaining 2 parts of decoction were filtered and used for further study.

**MICROSCOPIC STUDY OF ROOT OF Grewia hirsuta Vahl. (Fig.3)**
Microscope study of Root of (*Grewia hirsuta* Vahl.) - The transverse section of Root shows the circular in outline. Being it shows secondary growth, epiblema is absent. It shows following broad regions-

a) Cork region
b) Phellogen (Cork cambium)
c) Phelloderm (Secondary cortex)
d) Secondary Phloem
e) Medullary Rays
f) Secondary Xylem

**A) Cork region**
It is the outermost region of the section. The cork cells are brownish, lignified, thick walled, tangentially elongated, 2-4 celled wide and radially arranged. It is protective in nature.

**B) Phellogen (Cork cambium)**
The cells are thin walled, ability to divide and redivide, 1-2 cells wide and rectangular in shape. It is responsible for secondary growth.

**C) Phelloderm (Secondary cortex)**
It is 15-20 celled wide, made up of parenchymatous cells. It is responsible for storage of food materials. The cells are suberized and thick walled due to suberin deposition. These are filled with starch grains. The stone cells are also present in this region. It follows the secondary phloem which replaces the primary phloem and primary cortex.
D) Secondary Phloem
It is comparatively small zone made of Phloem parenchyma and sieve tubes. Medullary rays are reaching up to this region.

E) Medullary Rays
These are traverse from xylem regions upto secondary phloem. It becomes broaden towards periphery (up to Phloem). The rays cells are 1-2-3 cells wide. The cells are tangentially elongated and thin walled.

F) Secondary Xylem
Like secondary cortex this region is also broad, 15-20 cells wide. It consists of xylem parenchyma, vessels, tracheids and wood fibers. The cells are filled with pigment cells and starch grains. At the centre pith is absent.

MICROSCOPIC EXAMINATION OF CHURNA
Microscopic examination of Churna reveals presence of Pericyclic fibers, parenchyma cells, vascular bundles, cortex cells with intercellular space and phloem fibers.

OBSERVATION, RESULTS AND DISCUSSION
PHARMACOGNOSTICAL AND PHYTOCHEMICAL INVESTIGATIONS

Table 1 - Table showing physicochemical parameters of Churna

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of Test</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Description</td>
<td>Brown coloured powder</td>
</tr>
<tr>
<td>2.</td>
<td>Moister content</td>
<td>3.10%</td>
</tr>
<tr>
<td>3.</td>
<td>Ash value</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total ash value:</td>
<td>5.63%</td>
</tr>
<tr>
<td></td>
<td>Water soluble ash value:</td>
<td>3.35%</td>
</tr>
<tr>
<td></td>
<td>Acid insoluble ash value:</td>
<td>0.52%</td>
</tr>
<tr>
<td>4.</td>
<td>Extractive value</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Water soluble extractive value:</td>
<td>32.2%</td>
</tr>
<tr>
<td></td>
<td>Alcohol soluble extractive value:</td>
<td>62.39%</td>
</tr>
<tr>
<td>5.</td>
<td>Fiber contents</td>
<td>55-65%</td>
</tr>
</tbody>
</table>

Table 3: Table showing preliminary phytochemical screening of Churna

<table>
<thead>
<tr>
<th>1.</th>
<th>Preliminary Phytochemical analysis: Chemical Tests:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Test For carbohydrates</td>
</tr>
<tr>
<td></td>
<td>Test For Proteins</td>
</tr>
<tr>
<td></td>
<td>Test For Lipids</td>
</tr>
<tr>
<td>Test For Alkaloids</td>
<td>-</td>
</tr>
<tr>
<td>-------------------</td>
<td>---</td>
</tr>
<tr>
<td>Test For Glycosides</td>
<td>++</td>
</tr>
<tr>
<td>Test For Steroids</td>
<td>+</td>
</tr>
<tr>
<td>Test For Flavonoids</td>
<td>++</td>
</tr>
<tr>
<td>Test For Tannins</td>
<td>+</td>
</tr>
<tr>
<td>Test For Terpenoids</td>
<td>-</td>
</tr>
</tbody>
</table>

(+): Present in minor amount; (++): present in moderate amount; (-): not detectable.

The preliminary phytochemical screening of *Grewia hirsuta* Vahl. Churna revealed the presence of Carbohydrates, Glycosides, Flavonoids in moderate amount, Proteins, Steroids, Tannins in minor amount. The Lipids, Alkaloids and Terpenoids are not detectable.

**TLC Screening of Churna**

1. **Detection of Steroids**

   Solvent system used: Ethyl acetate: Methanol: Acetic acid (70:20:10)
   Spray reagents: Vanillin-Sulphuric acid reagent:
   Colour observed - blue, blue-violet or pink colored spots.
   Rf Value: 0.8

2. **Detection of Flavonoids**

   Solvent system used: Toluene: Ethyl acetate: Glacial acetic acid: Water (100:11:11:26)
   Spray reagents: Anisaldehyde-Sulphuric acid reagent:
   Color observed: yellow-green spots.
   Rf Value: 0.73

3. **Detection of Tannins**

   Solvent system used: Ethyl acetate: Formic acid: Acetic acid: Water (100:11:11:26)
   Spray reagents: 5% Ferric chloride reagent:
   Color observed: bluish black spots.
   Rf Value: 0.70

**PHYTOCHEMICAL ANALYSIS OF KWATH**

**Table 4 - Table showing physicochemical parameters of Kwath**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of Test</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Description</td>
<td>Brown coloured</td>
</tr>
<tr>
<td>2</td>
<td>pH value</td>
<td>5.6</td>
</tr>
<tr>
<td>3</td>
<td>Viscosity:</td>
<td>1.052 centistoke</td>
</tr>
<tr>
<td>4</td>
<td>Total solid contents</td>
<td>0.1%</td>
</tr>
<tr>
<td>5</td>
<td>Refractive Index</td>
<td>0.89</td>
</tr>
<tr>
<td>6</td>
<td>Specific gravity</td>
<td>1.263</td>
</tr>
</tbody>
</table>
Table 5 – Table showing preliminary phytochemical screening of Kwath

<table>
<thead>
<tr>
<th>Preliminary Phytochemical analysis: Chemical Tests:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test For carbohydrates</td>
</tr>
<tr>
<td>Test For Proteins</td>
</tr>
<tr>
<td>Test For Lipids</td>
</tr>
<tr>
<td>Test For Alkaloids</td>
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</tr>
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</tr>
<tr>
<td>Test For Tannins</td>
</tr>
<tr>
<td>Test For Terpenoids</td>
</tr>
</tbody>
</table>

(+) Present in minor amount; (++) present in moderate amount; (-) not detectable.

The preliminary phytochemical screening of Mool Kwath of Nagbala (*Grewia hirsuta* Vahl.) reveals the presence of Carbohydrates, Glycosides, Flavonoids in moderate amount followed by Proteins, Alkaloids, Tannins in minor amount. The Steroids, Tannins are not detectable.

**TLC screening of Kwath**

1. **Detection of Steroids**

   **Solvent system used:** Ethyl acetate: Methanol: Acetic acid (70:20:10)

   **Spray reagents:** Vanillin-Sulphuric acid reagent:

   **Colour observed** – blue, blue-violet or pink coloured spots.

   **Rf Value:** 0.78

2. **Detection of Flavonoids**

   **Solvent system used:** Toluene: Ethyl acetate: Glacial acetic acid: Water (100:11:11:26)

   **Spray reagents:** Anisaldehyde-Sulphuric acid reagent:

   **Color observed:** yellow-green spots.

   **Rf Value:** 0.75

3. **Detection of Tannins**

   **Solvent system used:** Ethyl acetate: Formic acid: Acetic acid: Water (100:11:11:26)

   **Spray reagents:** 5% Ferric chloride reagent:

   **Color observed:** bluish black spots.

   **Rf Value:** 0.60
Fig 1 – *Grewia hirsuta* Vahl.

Fig 2 – Dried roots of *Grewia hirsuta* Vahl.

Fig 3 – T.S. of root of *Grewia hirsuta* Vahl.
CONCLUSION

Nagbala is important Rasayana drugs mentioned in all Ayurvedic texts. *Grewia hirsuta* Vahl. is amongst 3 species of Nagbala considered by scholars. Description and quality standards of *Grewia hirsuta* Vahl. is not available in Ayurvedic Pharmacopia of India.

In preliminary phytochemical analysis Both dosage forms that is Kwath and Churna of root of *Grewia hirsuta* Vahl. reveals presence of flavanoids, Glycosides and Carbohydrates in moderate amount. followed by Proteins, Alkaloids, Tannins in minor amount. The Steroids, Tannins are not detectable.

This pharmacognostical and phytochemical study of *Grewia hirsuta* Vahl is useful to provide information for the standardization and for further experimental and clinical research.

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