Pharmacognostical and phytochemical investigation of *Barleria prionitis* Linn leaves.

Bhaskar K. Gupta*1, Narayan P. Gavatia1 Mukul Tailang2

1Bhagwant University, Ajmer –305004, Raj (India)
2IPES, Baddi University, Baddi H.P. India

Received on:10-11-2011; Revised on: 15-12-2011; Accepted on:12-01-2012

ABSTRACT

In the present study leaves of *Barleria prionitis* Linn was subjected to pharmacognostical studies such as macroscopic, microscopic and micromeretics parameters were also observed. Physicochemical studies such as ash values, extractive values of plant part were carried out to confirm the identity of plant. Ash values such as total ash, acid insoluble ash and water soluble ash were determined and recorded. Extractive values such as alcohol soluble extractives and water soluble extractive values were also determined. The leaves of *Barleria prionitis* Linn shows the presence of phytoconstituents such as alkaloids, glycosides and tannins.

Key words: *Barleria prionitis*, Microscopy, Pharmacognosy, Photochemistry

INTRODUCTION

*Barleria Prionitis* L. (Acanthaceae), commonly known, Kuranaka, Korana, Keranaka. A much-branched, prickly shrub, up to 0.6 to 3.0 m in height, found growing throughout the hotter parts of India. It is also commonly grown as a hedge plant in gardens as in Ayurveda, used as kushtha it is a febrifuge formulation.

The leaves and stems showed the presence five of iridooid glucosides; three of them, acetyl barlerin (C_{11}H_{13}O_{10}H_{2}O, amorphous, 6.8-di-0-acetyl barlerin hiside methyl ester), barlerin (C_{11}H_{12}O_{11}H_{2}O, amorphous, 8-O-acetyl shanzhiside methyl ester), and shanzhiside methyl ester have been characterized. Flowers are reported to contain the flavone glycoside, scutellarein 7-neohesperidoside. The presence of B-sitosterol is reported in the plant.

The plant has antiseptic properties; its decoction is used as a wash in dropsy. The roots are used as a febrifuge. As a decoction they are employed as a mouthwash to relieve toothache, and as a paste they are applied over boils and glandular swellings. The dried bark is given in whooping-cough. Fresh juice of the bark is diaphoretic and expectorant, and is given in anasarca. The leaves and flowering tops are rich in soluble potassium salts, and are valued as a diuretic. The leaf juice mixed with honey or sugar is given in urinary and paralytic affections, and stomach disorders. The leaf juice is often applied to lacerated soles of feet in the wet season; with coconut oil it is applied on the face for pimples. The fresh leaves are crushed and tied on the wounds caused by sharp-edged tools. They are also used for rheumatic pains and itch.

MATERIAL AND METHODS

1. Procurement and authentication of Crude drugs:

The leaves of *Barleria prionitis* were collected in the month of September-October from Govt. garden, saket nagar, Bhopal. Plants were identified and authenticated in National Institute of Science Communication and Information Resources (NISCAIR/RHMD/Consult/2009-10/1359/161). The leaves were dried in shade and was powered moderately and passed through sieve No. 22/40.

2. Evaluation Parameters:

(A) Pharmacognostic examination:

(i) Macroscopic examination: 6,7

The leaf of *Barleria Prionitis* linn, dorsiventral, variable in size, 6-9.5 cm long, 2.5 - 3.5 cm wide, simple, elliptic, acuminate, entire, acute, reticulate, unicostate, glabrous above, glabrous or pubescent beneath petiole short and the young stem grey, slightly four angled, usually with 3-4 dircaricate spines at axil of leaf mature stem cylindrical with longitudinally arranged or scattered dot-like lenticels externally greyish to light brown a few mature stem slightly hollow.

(ii) Microscopic examination: 6,7

Leaves of *Barleria prionitis* were washed and boild in water for 2 min until became soft enough to be cut using a sharp blade. Then transverse sections of leaves were observed under microscope.

lower epidermis; parenchyma many layered in upper surface and no of layers in lower surface towards proximal end, circular to polygonal and thin-walled; some contain raphides of calcium oxalate; vascular bundle semi-lunar, situated centrally in arechymatous ground tissue; xylem vessels arranged in radial rows, protoxylem towards centre; two smaller vascular bundles present on either sides of central vascular bundle. Midrib - Single layered epidermis on both surfaces covered externally with thick cuticle. Collenchyma, parenchymatous cells shows single vascular bundle Lamina Simple layered epidermis covered with thick cuticle on both surfaces, glan-dular (Figure 1)

(B) Micromeretic parameters: 8

(i) Angle of repose:

Angle of repose is the maximum angle possible between the surface of a pile of the powder and the horizontal plane. (Table-1)

Procedure:

A glass funnel is held in place with a clamp on a ring support over a glass plate. Approximately 50 gm of powder is transferred in to the funnel by keeping the orifice of the funnel blocked by the thumb. As the thumb is removed, the lab-jack is adjusted so as to lower the plate and maintain about a 3 mm gap between the bottom of the funnel stem and the top of the powder pile. When the powder is emptied from the funnel, the angle of the heap to the horizontal plane is measured with the protractor and calculated by following formula.

<table>
<thead>
<tr>
<th>Corresponding author.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bhaskar K. Gupta</td>
</tr>
<tr>
<td>Bhagwant University,</td>
</tr>
<tr>
<td>Ajmer –305004,</td>
</tr>
<tr>
<td>Raj (India)</td>
</tr>
</tbody>
</table>
\[
\theta = \tan^{12} \frac{h}{r}
\]
Where,
- \( h \) = height of pile,
- \( \theta \) = angle of repose,
- \( r \) = radius of the base of the pile

(ii) Bulk Density:
Bulk density is the mass of powder divided by its bulk volume. A Powder (about 60 gm) was passed through a standard sieve no.20. A weighed amount (approx. 50gm) was introduced in to the bulk density apparatus, (aim is that to fill the measuring cylinder up to 75 ml) and the timer knob was set for 100 tapings. The volume occupied by the powder was noted. This final volume was the bulk volume. Then bulk density was calculated by using this equation. (Table-2)

\[
\text{Bulk density (ii)} = \frac{\text{Mass of powder}}{\text{Bulk volume}}
\]

(iii) Tapped Density:
Tapped density was achieved mechanically by tapping a measuring cylinder containing a powder sample. After observing the initial volume, the cylinder was mechanically tapped, and volume readings were taken until little further volume change was observed. (Table-3)

\[
\text{Tapped density (ii)} = \frac{\text{Mass of powder}}{\text{Tapped volume}}
\]

(C) Extraction:
The crude dried powdered drugs 50gm were kept for maceration in 200ml (approx. 50gm) was passed through a standard sieve no.20. A weighed amount (about 60 gm) was passed through a standard sieve no.20. A weighed amount (approx. 50gm) was introduced in to the bulk density apparatus, (aim is that to fill the measuring cylinder up to 75 ml) and the timer knob was set for 100 tapings. The volume occupied by the powder was noted. This final volume was the bulk volume. Then bulk density was calculated by using this equation. (Table-2)

Determination of water soluble extractive value:
Five gm of powdered drug was macerated with 100ml of water closed flask for 2hr and was occasionally shaken with 6hr time period and was allowed to stand for 18hr. After filtration the 25ml of the filtrate evaporated to dryness in a tared flat bottomed shallow dish. Dried at 105°C and weighed. Percentage of water soluble extractive value was calculated with reference to the air dried drug. (Table-4)

Determination of alcohol soluble extractive value:
Ethyl alcohol (95% v/v) was used for determination of alcohol soluble extractive.

Determination of total ash:
The ash obtained from the previous process was boiled with 25ml of 2M HCl for 5 min. and the insoluble matter was collected on ash-less filter paper and was washed with hot water, ignited, cooled in a dessicator and weighed. Percentage of total ash was determined with reference to the air dried drug. (Table-5)

Determination of acid insoluble ash:
The ash obtained from the previous process was boiled with 25ml of water for 5 min. and the insoluble matter was collected on ash-less filter paper and was washed with hot water, ignited for 15min. at a temperature not exceeding 450°C. The weight of the insoluble matter was subtracted from the weight of the ash and this represents the water soluble ash. Percentage of water soluble ash was calculated with reference to the air dried drug. (Table-5)

E. Qualitative Phytochemical analysis:
The extracts obtained were subjected to various qualitative tests to reveal the presence or absence of common phytopharmaceuticals by using standard tests. (Table-6)

**RESULT**

### Table-1 Angle of repose

<table>
<thead>
<tr>
<th>Drug</th>
<th>Height of pile(cm)</th>
<th>Diameter of the base of the pile (cm)</th>
<th>Radius of the base of the pile (cm)</th>
<th>Angle of repose (( \theta ))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barleia prionitis L</td>
<td>4.8</td>
<td>13</td>
<td>6.5</td>
<td>36.12</td>
</tr>
</tbody>
</table>

### Table-2 Bulk Density (g/cm³)

<table>
<thead>
<tr>
<th>Drug</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barleia prionitis L</td>
<td>0.33</td>
<td>0.33</td>
<td>0.33</td>
<td>0.33</td>
</tr>
</tbody>
</table>

### Table-3 Tapped Density (g/cm³)

<table>
<thead>
<tr>
<th>Drug</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barleia prionitis L</td>
<td>0.34</td>
<td>0.34</td>
<td>0.35</td>
<td>0.34</td>
</tr>
</tbody>
</table>

### Table-4 Solvent Extractive Value

<table>
<thead>
<tr>
<th>Name of the drug</th>
<th>Water soluble Extractive value % w/w</th>
<th>Alcohol soluble Extractive value % w/w</th>
<th>Chloroform Soluble Extractive value % w/w</th>
<th>Moisture content (w/w)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barleia prionitis L</td>
<td>28.88</td>
<td>10.45</td>
<td>4.68</td>
<td>3.2</td>
</tr>
</tbody>
</table>

### Table-5 Physico-chemical Characteristics

<table>
<thead>
<tr>
<th>Name Of The Drug</th>
<th>Foreign Organic Matter (%)</th>
<th>Total Ash Value (%)</th>
<th>Acid Insoluble Ash Value (%)</th>
<th>Water Soluble Ash Value (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barleia prionitis L</td>
<td>0.8</td>
<td>6.1</td>
<td>90</td>
<td>90</td>
</tr>
</tbody>
</table>
DISCUSSION
Macroscopic study reveals that the *Barleria Prionitis* leaves were dorsiventral, variable in size, 6-9.5 cm long, 2.5 - 3.5 cm wide, simple, elliptic, acuminate, entire, acute, reticulate, unicostate, glabrous above, glabrous or pubescent beneath petiole short and the young stem grey, slightly four angled, usually with 3-4 divaricate spines at axil of leaf mature stem cylindrical with longitudinally arranged or scattered dot-like lenticels externally greyish to light brown a few mature stem slightly hollow.

Under microscopic study we found lower epidermis; parenchyma many layered in upper surface and no. of layers in lower surface towards proximal end, circular to polygonal and thin-walled; some contain raphides of calcium oxalate; vascular bundle semilunar, situated centrally in arechymatous ground tissue; xylem vessels arranged in radial rows, protoxylem towards centre; two smaller vascular bundles present on either sides of central vascular bundle. Midrib - Single layered epidermis on both surfaces covered externally with thick cuticle. Collenchyma, parenchymatous cells shows single vascular bundle Lamina Single layered epidermis covered with thick cuticle on both surfaces, glandular

Micromeretic parameters such as angle of repose, bulk density and tapped density were found to be 36.12, 0.33, and 0.34 respectively. Water, alcohol and chloroform soluble extractive value were found to be 28.88 % (w/w), 10.45 % (w/w) and 4.68 % (w/w) respectively. Moisture content and foreign organic matter were 4.2 % (w/w) and 1.8 % respectively. Total ash value, acid insoluble ash and water soluble ash were found to be 6.1 %, 9 %, and 9% respectively. Qualitative phytochemical tests showed the presence of alkaloids, Flavonoids & Tannins in ethanolic extract of *Barleria Prionitis* leaves.

**CONCLUSION**
From the above studies it can be concluded that the various parameters such as pharmacognostical, phytochemical and micromeritics parameters of the leaves of *Barleria Prionitis* may be utilized for its identification and differentiation from other species. Phytochemical investigation reveals the presence of alkaloids and Flavonoids’s, tannins in etanolic extract of *Barleria Prionitis* leaves. Due to presence of these compounds in the leaves of *Barleria Prionitis*, it may have good antioxidant activity, anti-inflammatory activity, Gastric cytoprotective activity and diuretic activity etc. Thus the *Barleria Prionitis* leaves may be a good choice for the futuristic research on such activities.

**REFERENCES:**

Source of support: Nil, Conflict of interest: None Declared