Research Article

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PHARMACOGNOSY OF DIFFERENT PARTS OF *BRAHMKAMAL* (*SAUSSUREA OBVALLATA* (DC.) EDGEW.): THE STATE FLOWER OF UTTARAKHAND, INDIA

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ABSTRACT

Brahmkamal, a spiritually revered medicinal herb of alpine range of Himalaya. Brahmkamal is the State flower of Uttarakhand. It is a very useful plant in prospective of traditional ayurvedic medicines, largely used by the natives residing in Himalayas. The plant has an undervalued status in the scientific community. Till date there is least focus on Pharmacognostical and Pharmaceutical studies of Brahmkamal. This study includes the collection of plant sample from alpine Himalayas followed by authentication of botanical identity *Saussurea obvallata* (DC.) Edgew. The flowers are present in umbel like clusters which showed the characteristic features of Asteraceae family. The Pharmacognostical study of different parts of Brahmkamal *provide* measures for identification. Its rhizome, stem, leaf and flower dried samples were used to perform Pharmacognostical study. The transverse section of stem showed that it is a dicot plant. Standardization & Quality evaluation of herbal drugs is quite important. The very first step for standardization is identification. This present study is an attempt to find out potential measures such as Pharmacognosy including macroscopy, microscopy and organoleptic study of different parts of Brahmkamal which assist in elementary identification of genuine plant samples.

Keywords: *Saussurea obvallata*, Pharmacognosy, Macroscopy, Microscopy, Organoleptic Study, Transverse section.

INTRODUCTION

Brahmkamal "The king of Himalayan Flowers". *Brahmkamal* is a medicinal herb of Asteraceae family,[1,2] use to treat many diseases by the local inhabitants. It is mentioned in Tibetan system of medicine to treat number of diseases like cerebral ischemia, dropsy and many more[3].

Taxonomic Profile[4,5]

Table 1.1: Taxonomic profile of *Saussurea obvallata*

Kingdom	Plantae
Phylum	Tracheophyta
Class	Magnoliopsida
Order	Asterales
Family	Asteraceae
Tribe	Cynareae
Genus	*Saussurea*
Species	*Saussurea obvallata*
Binomial name	*Saussurea obvallata* (DC.) Edgew.
Synonyms	*Aplotaxis obvallata* DC. *Theodorea obvallata* (DC.)Kuntze

MATERIAL AND METHODS

Collection: Genuine samples of Brahmkamal *(Saussurea obvallata)* and its different parts viz. Root, Rhizome, Stem, Leaf, Flower were collected from **Hemkund Sahib, Chamoli district, Uttarakhand** (around 285 km from Rishikesh), at an altitude of 15200 feet above sea level. (Fig.1.1)

Date of Collection : O9/09/2016

We (Scholar & Supervisor) collected Brahmkamal plant samples from its natural habitat near Hemakund sahib at an altitudinal range of around 15000 feet in mid Sept 2016. We started tracking from Govind ghat which is around 285 km from Rishikesh to Ghangharia merely 16 km from Govind ghat. We started tracking with fullest of enjoyment and the beauty of nature made it so comfortable. After 8 hours of tracking we reached at Ghangaria and stay there. Next day the time is to go for Valley of Flowers National Park. In most of the text it is mentioned that *Brahmkamal* is abundantly grows in Valley of Flowers National park. But we didn't find a single plant in whole valley. Third day we start our tracking towards Hemkund Sahib, which is quite tough. But as we were near the Gurudwara hills, Brahmkamal blooms near around the hills in between the rocks and grasses. Brahmkamal flowers gives a beautiful appearance to the hills and it made our day. Just after a look of the divine herb Brahmkamal we also feel the divine properties of flower, we felt more refreshed and forget absolute weariness. The plant height is around 30-50 cm. It is very easy to root up whole plant, its root is not deeply seated. We collected few samples of Brahmkamal for study. Best time for collection of plant for medicinal use is in October because the plant perishes after mid-October, but flower collection should be in mid-September because after that the flowers shed off.

Details of collection of genuine plant sample is tabulated in [Table 1.2]

Authentication: A herbarium of Brahmkamal was prepared (Fig. 2.1) and authenticated at Botanical Survey of India, Dehradun. (Fig. 2.2).

Macroscopic & Organoleptic Study

All the collected genuine samples of Brahmkamal were dried and studied macroscopically with naked eye, magnifying lens and measuring tape with the help of Pharmacognostical parameters i.e

shape, size, surface, colour, odour and taste and findings were recorded. Organoleptic study was done with the means of different senses.

Microscopic Study
Microscopic study of a plant is another aid of Pharmacognosy which can be helpful in the process of standardization of medicinal plants. This study can be helpful in identifying drug by their known histological characters through Transverse section (T.S) or Longitudinal section (L.S) or Radial Longitudinal section (R.L.S) or Tangential Longitudinal section (T.L.S) and Powder microscopy which can help in evaluation of different constituents.

Transverse Section
Materials: Specimen of genuine sample of different parts of Brahmkamal (*Saussurea obvallata*) viz. Root, Stem, Leaf.

Methodology: Specimens were soaked in water or other solvents depending upon the hardness of the sample and transverse sections were taken using sharp razor blades. Numerous temporary and permanent mounts of the microscopial sections of the specimen were made and examined microscopically. Different staining reagents were applied on transverse sections so as to differentiate between different cell wall components.

Powder Microscopy: Powder of genuine samples of different parts of Brahmkamal (*Saussurea obvallata*) viz. Rhizome, Stem, Leaf, Flower.

Methodology: To study the presence or absence of various types of tissues or structures, the shade dried samples of rhizome, leaf, stem and flower of Brahmkamal are powdered using electric grinder, passed through sieve No. 60, stain with Phloroglucinol + Conc. HCl and then subjected for microscopic studies.

OBSERVATION & RESULT

Pharmacognostical Study

Macroscopic characters of different parts of Brahmkamal *(Saussurea obvallata)*
(a) Root & Rhizome: Dark brown colour long tap root; root stock woody, thick, stout; rhizome is dark brown and tapering, densely covered with remnants of petioles of withered leaves. (Fig.3.1&3.2)
(b) Stem: Brown colour, erect, stout, hollow, 12 – 15 ridges present on its outer surface. (Fig.3.3)
(c) Leaf: Leaves green, simple, pinnate venation, **lower petioled, upper sessile**, oblong or ovate, elliptic, lanceolate, stipule absent, toothed margins. (Fig.3.4)
(d) Flower: Flower head purple present in cluster enclosed by yellow papery bracts in cone shape, bracts with dark purple margins and tips. (Fig.3.5)
(e) Seed: Brown colour seeds are present with white feathery hairs attached at one on its end helps in dispersion of seeds known as pappus which gives a small floret like appearance to seeds. (Fig.3.6)

Macroscopic characters of different parts of Brahmkamal *(Saussurea obvallata)* tabulated in [Table 1.3]

Organoleptic Study (Fig. 4.1,4.2 & 4.3)

The flower of *Saussurea obvallata* was highly fragrant; leaf also had specific fragrance otherwise all the other parts were odourless. Taste of bracts was sweet, astringent; rhizome & leaf taste was bitter astringent; stem taste was astringent. All parts were coarse in touch.
Organoleptic characters of different parts of Brahmkamal (*Saussurea obvallata*) tabulated in [Table 1.4]

Microscopic Study

Microscopic characters of different parts of *Brahmkamal (Saussurea obvallata)* in transverse section (T.S)
Stem: TS of stem showed many prominent ridges on the outer most side. Epidermis made up of parenchyma cells; Hypodermis made up of few layers of collenchyma cells. Ground tissue differentiated into cortex, endodermis, pericycle. Vascular bundle are wedge shaped, arranged in ring. Vascular bundle is collateral open type with procambium clearly shows that it is dicot stem. (Fig.5.1)
Leaf: Upper and lower epidermis present in leaf lamina. Epidermis present in single layer, made up of parenchymatous cells. Stomata present in lower epidermis. Palisade and spongy parenchyma present. Vascular bundle present in centre. (Fig.5.2)
Root: Epidermis is uncilliate, after that cortex present which is multicellular. Intercellular spaces present in cotex. After that endodermis present made up of barel shaped cells. Pericycle is single layered. Vascular bundles are radially arranged. Pith region is very small. (Fig.5.3)

Powder Microscopy Study
- Tracheid, pitted vessels, parenchymatous cells, prismatic crystals, fibre, oil globules present in flower. (Fig.6.1)
- Cork cells, pitted vessels, fragments of endocarp, leaf fragment, fragment of xylem present in leaf. (Fig.6.2)
- Cork cells, pitted vessels, annular vessels, calcium oxalate crystals, iodine, group of lignified fibres present in stem. (Fig.6.3)
- Cork cells, tracheids, starch, tracheids reticulate vessels, fibre present in rhizome. (Fig.6.4)

Comparison of the features seen in the Powder microscopy of different parts of Brahmkamal (*Saussurea obvallata*) i.e. Rhizome, Stem, Leaf & Flower tabulated in [Table 1.5]

DISCUSSION

The present study is a step towards the standardization of sacred medicinal herb. All the samples collected were studied macroscopically, oraganoleptically & microscopically to furnish identification tools of different parts of Brahmkamal.

CONCLUSION

Pharmacognosy of different parts of the plant present the protocol for identification, quality & safety of the rhizome, stem, leaf, flower of *Saussurea obvallata.*

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Table 1.2

Name of the Plant	Time of Collection	Place of Collection	Authentication of Herbarium
Brahmkamal (*Saussurea obvallata*)	September 2016	Hemkund Sahib, Uttarakhand	BSI, Dehradun

Table 1.3

Features	***Saussurea obvallata* (DC.) EDGEW**
Habitat	Alpine or sub alpine range of Himalayas
Size of Plant	30-50 m
Leaf	Elliptic or oblong; lanceolate, lower petioled upper sessile
Flower	Cone shape inflorescence; Yellowish green papery bracts purple at its top; flower present in umbel like cluster.
Stem	Stout, hollow, straight lines or ridges present at outer surface
Rhizome	Dark brown colour; densely covered with remains of leaf bases.
Seed	Brown colour with hairy pappus gives a small floret like appearance.

Table 1.4

Parts	Colour	Odour	Touch	Taste	Shape	Size
Rhizome of *Saussurea obvallata*	Dark Brown	Odourless	Coarse	Bitter, Astringent	Tapering, covered with leaf remnants	Measurement with leaf remnants: L.10-15cm, D.15-17 cm.
Stem of *Saussurea obvallata*	Brown	Odourless	Coarse	Astringent	Stout, erect	L.15-30 cm D.1.5-2.5 cm
Leaf of *Saussurea obvallata*	Green	Fragrant	Coarse	Bitter, Astringent	Obovate, oblong	L.7.5-20cm, W.2-3cm
Flower of *Saussurea obvallata*	Purple Bract: Yellow	Fragrant	Coarse	Sweet(bract) Astringent	Dense umbel like cluster	Single flower: L1.5-2.5cm, D.3-4 cm. Inflorescence:L.10-25cm, W.10-13cm, D.20-23cm.

Table 1.5

Features	Rhizome of *S.obvallata*	Stem of *S.obvallata*	Leaf of *S.obvallata*	Flower of *S.obvallata*
Starch	+	-	-	-
Tracheids	+	-	-	+
Tracheids reticulate vessels	+	-	-	-
Cork cells	+	+	+	-
Fibre	+	-	-	+
Annular vessels	-	+	-	-
Calcium Oxalates crystal	-	+	-	-
Iodine	-	+	-	-
Group of lignified fibres	-	+	-	-
Pitted vessels	-	+	+	+
Fragments of endocarp	-	-	+	-
Leaf Fragment	-	-	+	-
Fragment of xylem	-	-	+	-
Parenchymatous cells	-	-	-	+
Prismatic crystals	-	-	-	+
Oil globules	-	-	-	+

Fig. 1.1 – Collection Of *Brahmkamal*

Fig. 2.1- Herbarium of *S. obvallata*

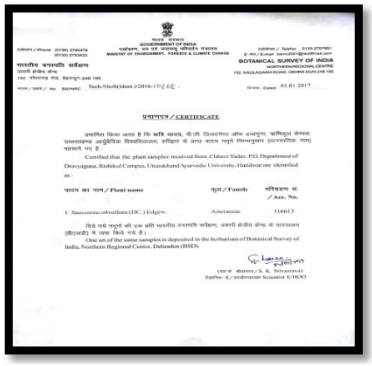

Fig.2.2- Authentication certificate

Fig. 3.1- Dried Sample of rhizome of *S. obvallata*

Fig. 3.2- Dried Sample of root of *S. obvallata*

Fig. 3.3- Dried Sample of stem of *S. obvallata*

Fig.3.4- Leaf of *S. obvallata*

Fig.3.5- Flower of *S. obvallata*

Fig.3.6- Seed of *S. obvallata*

Fig. 4.1- Organoleptic study of rhizome of *S. obvallata*

Fig. 4.2- Organoleptic study of leaf of *S. obvallata*

Fig. 4.3- Organoleptic study of flower of *S. obvallata*

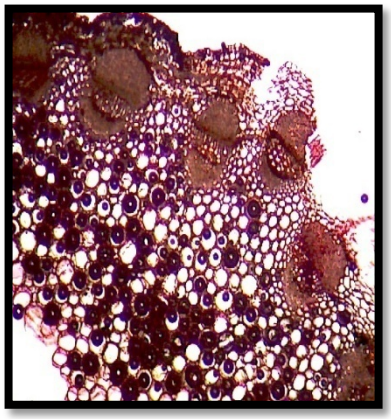

Fig. 5.1- T.S of Stem

Fig. 5.2- T.S of Leaf

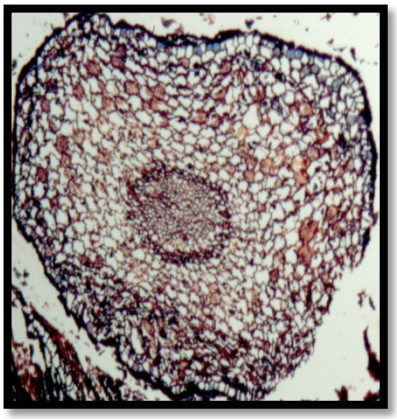

Fig. 5.3- T.S of Root

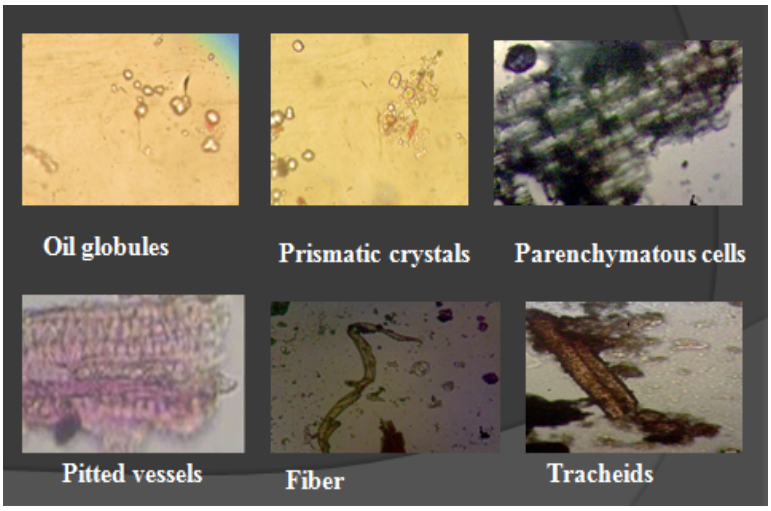

Fig. 6.1- Powder microscopy of Flower

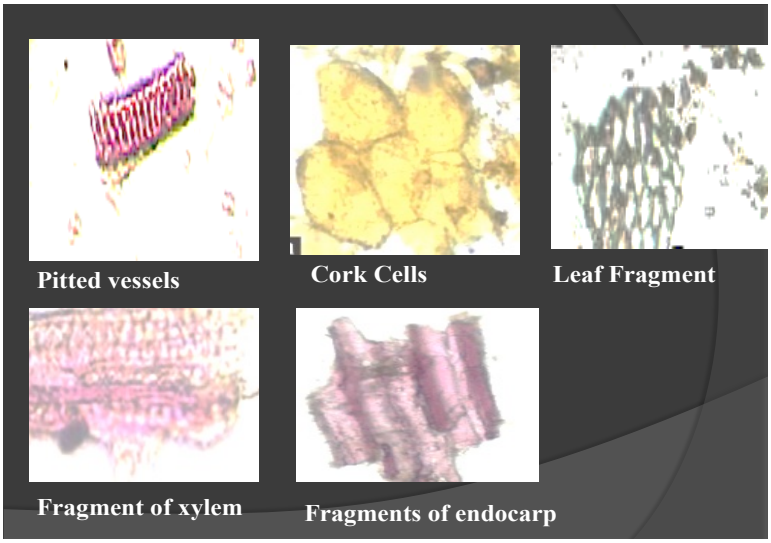

Fig. 6.2- Powder microscopy of Leaf

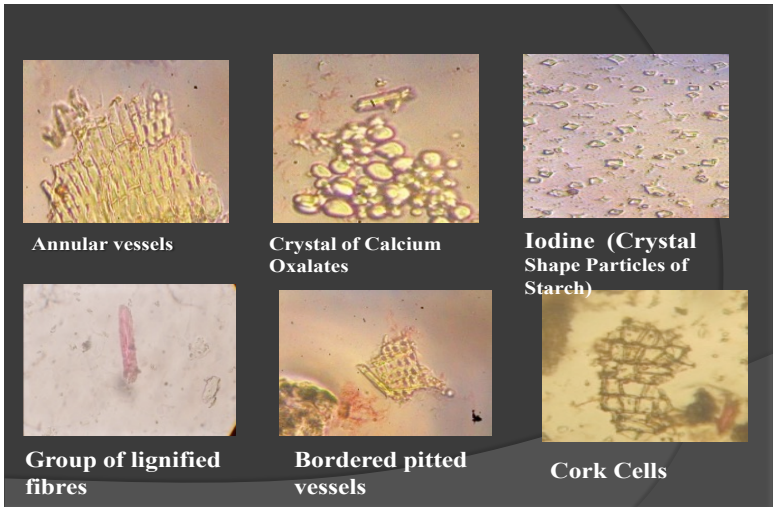

Fig. 6.3- Powder microscopy of stem

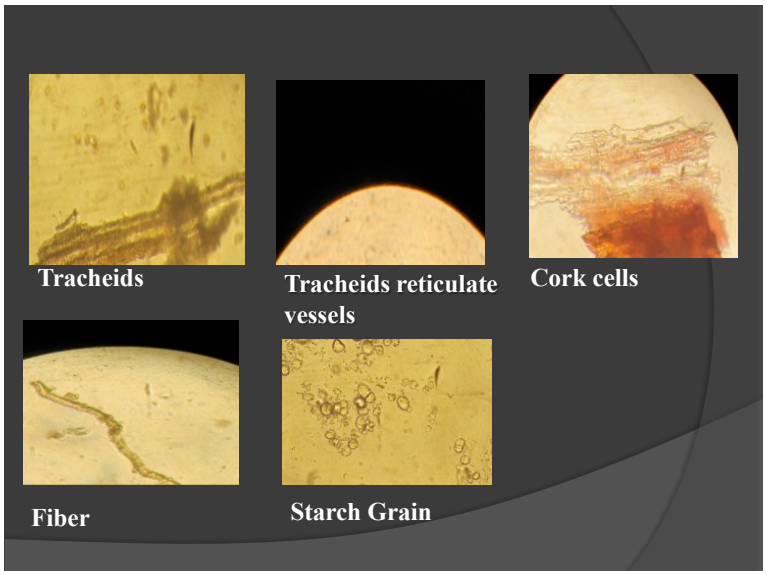

Fig. 6.4- Powder microscopy of rhizome

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