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Research Article

Exploring The Potentials Of Colebrookea Oppositifolia For Treatement Of Mouth Ulcers

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ABSTRACT

Mouth ulcers are a common, painful condition that can have a detrimental effect on one's quality of life. The creation of novel treatments derived from natural sources, such as plant extracts and phytochemicals, is gaining popularity. One such plant that has shown promise for therapeutic effects but has not received enough attention is Colebrookea oppositifolia. The current status of research on C. oppositifolia is outlined in this review, along with an assessment of the plant's potential for use as an integrative medicine to treat mouth ulcers. The goal of future studies should be to clarify the pharmacological processes by which products derived from C. oppositifolia provide anti-mouth ulcer therapeutic benefits. In summary, C. oppositifolia exhibits early promise as a novel therapeutic agent for a prevalent chronic illness that requires enhanced integrative medical solutions with negligible side effects.

INTRODUCTION

A mouth ulcer, also referred to as an oral ulcer or a mucosal ulcer, is a sore on the mucous membrane of the oral cavity. Painful, circular or oval-shaped sores or ulcers can appear in the mouth, usually on the inside of the lips or cheeks. Numerous conditions, each with a distinct mode of action, can cause mouth ulcers. Nevertheless, these ulcers typically have no significant underlying cause. Mouth ulcers can be caused by a wide range of things, such as poor dental hygiene, infections, stress, constipation, mechanical injuries, food allergies, hormone imbalances, skin issues, and dietary deficiencies like iron and vitamins B12 and C. Because it can make it uncomfortable to eat, drink, and brush your teeth while they are present, mouth ulcers are also frequently referred to as aphthous ulcers.(1)

Mouth ulcers can be categorized as minor, major, or herpetiform based on their size and quantity.

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- Minor ulcers These typically go away in 10 to 2 weeks and have a diameter of 2-8 millimeters.
- Major ulcers: These have a raised or uneven border and are typically deeper and larger. This kind of ulcer may leave a scar in the mouth and take many weeks to heal.
- Herpetiform ulcers: A cluster of several tiny lesions, roughly the size of pinheads, make up this form of ulcer. (2)

Causes:

- **Stress:**

Because emotional stress weakens the immune system, mouth ulcers are more likely to develop.

- **Minor Trauma:**

Dental work, excessive brushing, or inadvertent biting can all result in ulcers.

- **Diet:**

For certain people, eating acidic or spicy meals might result in mouth ulcers.

- **Viral Infections:**

Ulcerations can result from viral infections such as the herpes simplex virus.

- **Hormonal Changes:**

Fluctuations in hormones, such those that occur during menstruation, may be a factor in ulcer development. (3)

- **Underlying Health Conditions:**

Crohn's disease and other inflammatory bowel disorders are occasionally linked to ulcers.

Plant profile:

Colebrookea oppositifolia:

Common Name: Indian squirrel tail and locally it is known as Gaduns, Bhaman, Binda, Kala-bansa, Pansra, Bhirmoli

- Kingdom: Plantae
- Phylum: Eudicots
- Class: Asterids
- Order: Lamiales
- Family: Lamiaceae
- Genus: Colebrookea
- Species: oppositifolia

Phytogeography:

The plant grows in Yunnan, South-West China, India, Pakistan, Nepal, Myanmar, Thailand, and other countries. It grows in savanna forests and thickets in hot, dry regions up to 200–200 meters. Out of the 6,900–7,200 species that comprise this family, which is represented by 236 genera, about 400 species are known to exist in India. Members of this family are commonly referred to as aromatic species due to their high essential oil concentrations.(4) India is home to Colebrookea oppositifolia, also referred to as "Bhaman," which is found from the Himalayas to the Deccan. The herb has historically been used to treat a wide range of illnesses, such as dermatitis, diarrhea, fever, headaches, peptic ulcers, wounds, and hemostatics, epilepsy and fungicides. In this sense, the plant's roots are most frequently used. However, because the leaves of the Colebrookea oppositifolia plant are traditionally used in Himachal Pradesh to treat mild to severe cases of mouth ulcers, they are being used to treat mouth ulcers in this report. This herb has shown promise in traditional medicine and merits attention for its alleged benefits, despite not having been studied as extensively as some other medicinal plants. (5)

Pharmacognosy:

A genus of shrubs in the Lamiaceae family is called Colebrookea. They reach an average height of one to three meters and are erect, densely lanate-tomentose plants. Its pale, hairy, robust square branches and yellow-brown stems are distinctive. The three dentate, oblong-elliptic leaves can occasionally be found in whorls. Adaxially puberulent and rugulose, with an abaxially dense tomentose to lanate-tomentose base, a broadly cuneate to rounded margin, a long acuminate apex, and a crenulated, serrulate margin. Leaf blade: (10-15 × 3-5 cm), petiole: (0.8-2.5 cm). Numerous tiny white flowers (10–15 cm long) with branches 4-5 cm long, globose verticillasters (10–18

flowered), and bracteoles (1 mm), glabrous on the inside and densely tomentose on the outside, are found in panicles of upright spikes. The months of January through March through April are when flowers bloom.(6)

Identification:

An angiosperm, also known as a flowering plant, is characterized by the presence of flowers, ovules enclosed in carpels, a style and stigma at the top, and wood composed of actual vessels. A ring-shaped arrangement of vascular bundles, petiolate leaves, venation of reticulate leaves, tap roots, four to five merous flowers, and embryos with two cotyledons are characteristics that classify plants as Magnoliopsida or Dicotyledons. Shrubs are defined as plants having an erect, perennial habit, being either woody or herbaceous, having several stems, a distinct crown, and being less than five meters tall on average.(7) The presence of stamens, which can have four lobes or fewer, stamens alternating with petals, an irregular corolla, a superior ovary with four lobes, a style that emerges from between the ovary and lobes, and fruit that is usually nutlet-shaped are the traits that identify a plant as belonging to the Lamiaceae or Labiatae family. The Lamiaceae family contains 26 genera that are found in South India. Four perfect stamens, a five-partite calyx with plumose (hairy) lobes, and dry nutlets with a small scar distinguish the plant as Colebrookea Smith. The plant is known as Colebrookea oppositifolia Smith because it is the only species in the monotypic genus Colebrookea Smith.(8)

Traditional uses:

Traditional medicine has made extensive use of Colebrookea oppositifolia Smith to treat a variety of ailments, such as dermatitis, dysentery, fever, headaches, peptic ulcers, haemostatic wounds, hepatitis, urinary tract problems, fungicide, and epilepsy. The most popular method of treating epilepsy is with the plant's roots.(9) Applying leaves topically helps heal fractures, cuts, and bruises. To induce anthrax, boiling water is used to soften leaves, which are subsequently applied to sprains and fed to cattle. Toothaches are treated with compressed leaves. Leaf paste is applied to the fractured bone and to sores on the mouth and tongue. (10)

MATERIALS AND METHODS:

ETHNOMEDICINAL STUDIES:

To gather information about Colebrookea oppositifolia medicinal applications, a questionnaire was created. Respondents over 450 were selected at random, with no consideration given to their sex, occupation, or educational background. To help the respondents communicate more effectively, the interviews were ideally conducted at a time and in a language they could understand.(11)

PLANT MATERIAL

Collection, Authentication and Preservation of Sample

The plant specimen was gathered at Kot, Bilaspur, Himachal Pradesh in its natural setting.

The plant specimen was authenticated by Dr. Pankaj Sharma, Sr. Scientific Professional Himachal Pradesh State Biodiversity Board, Shimla, Himachal Pradesh Letter no.- HPSBB/272.

MACROSCOPIC STUDY

Morphological characteristics:

Morphological characteristics of bark of Colebrookea oppositifolia such as shape, texture, colour and peeling sections were studied as per visual observations and verified with standard taxonomical books.

Organoleptic study:

Organoleptic properties such as odour, taste and touch were visually and sensory observed. The collected data was precisely recorded and documented. (12)

PREPARATION OF PLANT EXTRACT

In order to compare effectiveness of extraction methods, the Phyto-constituents of the plant's

leaves and roots were extracted using Soxhlet extraction techniques.(13,14)

Extraction:

Soxhlet Extraction

The powdered plant material was extracted with methanol using the Soxhlet extraction method. Ten grams of plant powder were extracted at 60 degrees using 250 milliliters of ethanol in a round-bottom flask. The mixture was extracted until all of its color was gone, which could have taken up to one full day. (15) The extract was allowed to evaporate at room temperature until it had reduced to one-third of its original volume. The extracts were kept in vials and chilled to 40 degrees Celsius.(16)

PHOTOLUMINESCENCE STUDIES

Under visible and ultraviolet light, the fluorescence of a powdered plant material with different chemical reagents and extracts was observed.

PHYTOCHEMICAL SCREENING

Using coloration and precipitation reaction techniques, phytochemical screening for aqueous and methanolic extract was investigated for a variety of phytochemicals, including alkaloids, flavonoids, carbohydrates, tannins, terpenoids, steroids, reducing sugars, saponins, and glycosides. (17,18)

THIN LAYER CHROMATOGRAPHY

Preparation of Stationary Phase

The sample was applied to TLC-Precoated Plates that had silica gel G F254 (a fluorescent indicator) on them, one centimeter above the baseline.

Development of Chromatographic Chamber

A glass container with a water and methanol (1:1) solvent system was used to create the chromatographic chamber. To eliminate the edge effect, this chromatographic chamber was pre-saturated.

Development of Chromatogram

The stationary plate containing the sample was put into the pre-saturated chromatographic chamber so that the solvent or mobile phase was below the sample application spot. The sample was eluted through the TLC plate by the capillary action mechanism.(19)

Scanning and detection of the spots

The TLC plates were left to air dry. Using a UV chamber exposed to UV-visible radiation, including both near- and far-UV radiation, the spots were scanned and found. We computed the Rf value of spots using the following formula:

$$R_f = \frac{Distance\ \ travelled\ by\ spot\ from\ origin}{Distance\ travelled\ by\ solvent\ front}$$

All values were recorded precisely and documented. (20,21)

RESULTS AND DISCUSSION

MACROSCOPY STUDY

Morphological characteristics:

The leaves of Colebrookea Oppositifolia are rectangular to ovate-elliptic, measuring 10–18 cm in length by 3.5–7.5 cm in width, acuminate, with margins that are crenulate to serrate and pale tomentose underneath.

Organoleptic study:

Table1: Organoleptic properties of Colebrookea Oppositifolia leaves are:

Parameter	Observations
Touch/Texture	Smooth
Colour	Darkish Green
Taste	Bitter
Odour	Sweet grassy

PHOTOLUMINESCENCE STUDY

Under visible and ultraviolet light, the fluorescence of a powdered plant material with different chemical reagents and extracts was observed. The following is a list of the results obtained:

Table 2: Fluorescence characteristics of Colebrookea Oppositifolia leaves:

Sr. No.	Treatment	Visible light	UV Light 254nm (Shorter Wavelength)	UV Light 365nm (Long Wavelength)
1.	Leaves Powder	Dark green	Reddish-Brown	Dark purple
2.	Leaves Powder + 1N NaOH	Dark Brown-Black	Blood Red	Greenish-Black
3.	Leaves Powder + 1N HCl	Pale Yellow	Green	Greenish-brown
4.	Leaves Powder + 1N H2SO4	Pale Yellow	Green	Dark brown
5.	Methanolic extract	Greenish brown	Light Brown	Black

PHYTOCHEMICAL SCREENING

Various phytochemical tests were performed by using coloration and precipitation reactions. The obtained results are as follow:

Table3: Qualitative analysis of Colebrookea Oppositifolia leaves in methanol.

Sr No.	Phytochemicals	Phytochemical Test	Methanolic Extract
1.	Alkaloids	Mayer's test Dragendorff's test Wagner's test	+ + +
2.	Flavonoids	Lead acetate test Alkaline reagent test	+ +
3.	Terpenoids	Salkowski's test	-
4.	Saponins	Froth test	+
5.	Tannins	Ferric chloride test Gelatin test Borntrager's test	+ + -
6.	Reducing Sugars	Fehling's test Benedict's test	+ +
7.	Steroids	Salkowski's test	+
8.	Glycosides	Legal's test	+
9.	Carbohydrates	Molisch's test	+

+ = Present, - = Absent

Thin Layer Chromatography

Using methanol:distilled water (1:1) (MeOH: DW) as the mobile phase, qualitative chromatography of methanol and distilled water extract was performed. Under 254 nm Ultra-Violet radiation, a total of 5 spots were found in the chromatogram of the methanolic extract and 3 spots in the extract made from distilled water.

Table4: Rf value calculation in thin layer chromatography of Colebrookea Oppositifolia leaves under 254nm.

Extract	Mobile Phase	Total run(cm)	Number of spots	Distance of Solvent front from origin	Distance of spot from origin (Sample application site)	Rf value
Methanolic extract	MeOH + DW (1:1)	3	5	7	1.4 3.2 4.1 6.2 7.8	0.2 0.4571 0.5857 0.8857 1.1142
Distilled water extract	MeOH + DW (1:1)	3	4	7	1.4 4.2 6.2	0.2 0.60 0.8857

CONCLUSION:

The initial research indicates that Colebrookea oppositifolia leaves contain a wide range of bioactive substances that may have pharmacological implications. In conclusion, the preliminary phytochemical screening, Photoluminance study, and TLC analysis of leaf extracts from Colebrookea oppositifolia reveal a rich diversity of bioactive compounds with potential medicinal and industrial applications. Colebrookea oppositifolia leaves have the potential to be medicinal due to the presence of numerous phytochemicals, which calls for more research into their pharmacological characteristics. The Photoluminance study also Colebrookea oppositifolia possible use in optoelectronic applications. Colebrookea oppositifolia continues to reveal its significance in both traditional and modern scientific contexts through careful examination and exploration of its contents, opening up new possibilities for future research and development in the fields of nutraceuticals, pharmaceuticals, and beyond.

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