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Phyto-Chemical Investigations from Leaves and Flowers of *Spilanthes acmella* Murr



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ABSTRACT

The leaves and roots of plant *Spilanthes acmella* murr, Family- *Asteraceae* were investigated for its physicochemical and phytochemical screening. The whole plant of *Spilanthes acmella* murr is reported to exhibit good medicinal values in traditional system of medicines especially for the prophylaxis of various diseases. The present study deals with phytochemical investigations of determination of extracts (Petroleum ether extract, ethanol extract, Methanol extract, and aqueous extract). Total carbohydrate and tannin contents were studied. Ethanol soluble extractive value was found higher in the leaves while aqueous soluble extractive value were found to higher in the roots. Total carbohydrate percentage was found higher in the leaves. However, tannin contents were found at higher levels in the root portion of the plant. The preliminary phytochemical screening of *Spilanthes acmella* leaves and roots were carried out using qualitative chemical analysis. The observations revealed presence of Alkaloids, Glycosides, Tannins, Flavonoids, Terpenoids and Phlobatannis in different extracts of *Spilanthes acmella* murr.

INTRODUCTION

Plants contain a diverse group of highly valuable and readily available resource of bioactive metabolites viz. Alkaloids, tannins, essential oils and Flavonoids. According to World Health Organization approx. about 80% of the population in developing countries are unable to afford drugs and rely on traditional medicines especially those that are plant based in countries like India, Srilanka, Bangladesh, China and Japan. Exploration of the chemical constituents of the plants and pharmacological screening may provide us the basis for developing the lead for development of novel agents. Herbs have provided some of the important life savings drugs used in armamentarium of modern medicine. Among the estimated 400000 plants species, only 6% have been studied for biological activity and about 15% have been investigated phytochemically.

Herbal drugs play an important role in the health care programs especially in developing countries¹⁻³. Ancient Indian literature incorporates a remarkably broader definition of medicinal plants and considers all plant parts to be potential sources of medicinal substances⁴. However, a key obstacle, which hindered the acceptance of the alternative medicines in the developed countries, is the lack of documentation and stringent quality control procedures. There is an urgent need for documentation of research work carried out on traditional medicines³. With this backdrop, it becomes extremely important to make an effort towards standardization of the plant material to be used as medicine. The process of standardization can be achieved by stepwise pharmacognostic studies⁵⁻⁶. These studies help in identification and authentication of the plant material. Correct identification and quality assurance of the starting materials is an essential pre-requisite to ensure reproducible quality of herbal medicine which will contribute to its safety and efficacy. *Spilanthes acmella* Murr., commonly known as 'akarkara' is an indigenous herb of the family *Asteraceae*. It grows as an annual hairy herb throughout the tropic area; it is up to 32-60 cm tall with numerous stems of yellow flowers. Stems are glandular and hairy with pungent taste. The plant is distributed in tropical and subtropical areas and has medicinally active constituents. The whole plant is acrid in taste⁵. The main constituents namely "Spilanthol" and "acmellouate" are sometimes used to reduce the pain associated with toothaches and can induce salivary secretion. The leaves are used as immunomodulator, adaptogenic, tonic, diuretic, lithotriptic, antiscorbutic, digestive, sialagogic, antibacterial and is also used as a constituent in toothpaste for toothache⁷⁻¹⁴. The leaves contain alkaloids, carbohydrates, tannins, steroids,

carotenoids, provitamin A, α -carotene and β -carotene, essential oils, sesquiterpenes, and amino acid¹⁵⁻²¹. Preliminary studies have reported use of *Spilanthes acmella* as diuretic²², anti-inflammatory & analgesic²³, antioxidant & vasorelaxant²⁴. The flowers are chewed as whole to relieve toothache. They also produce redness of gums and increase salivation²⁵⁻²⁶.

No more information was found on phytochemical analysis of its leaves and roots, Therefore *Spilanthes acmella* Murr. plant parts are investigated for its phytochemical analysis.

MATERIALS AND METHODS

Collection and authentication of plant material

Fresh leaves of *P. marsupium* and *S. acmella* were collected from Ekant National Park and Nursery Bhopal, (MP) India during month of JAN-FEB'2014. The plant was identified by Glossary of Indian medicinal plants, Council of scientific and Industrial research, New Delhi. The collected plant material was washed thoroughly in running tap water, rinsed with distilled water and shade dried in open air and grounded into coarse powder by the help of mechanical process. Chemicals and Solvents used were of Analytical grade and purchased from Merck, Qualigens, and Himedia etc.

Preparation of Extracts

Powdered plant material (30g) was extracted at room temperature with petroleum ether (40-60°C) exhaustively and successively using soxhlet apparatus for 12 hours. The procedure was repeated with chloroform (CHCl₃), methanol (CH₃OH) and water (H₂O) respectively with drying the marc before the next batch of extraction. Extracts were filtered using Whatman filter paper no. 2 and excess solvent was removed by distillation. The combined aqueous extract was however concentrated under reduced pressure using rotary evaporator. Concentrated extracts were dried at 40°C temperature on a water bath. Dried extracts were collected and kept in sterile sample bottles at ambient temperature. Their yields and other physical properties were noted and recorded.

Table no. 1.Preliminary phytochemical screening of the *Spilanthes acmella Murr*

Tests	Petroleum ether extract	Chloroform extract	Methanolic extract
Tests for alkaloids			
Mayer's test	+	+	+
Dragendroff's test	+	+	+
Hager's test	+	+	+
Wagner's test	+	+	+
Phlobatannins			
	+	+	+
Tests for Flavonoids			
Ferric-chloride test	+	+	+
Shinoda's test	+	-	-
Alkaline reagent test	+	+	+
Glycosides			
Baljet test	+	+	+
Legal's test	+	+	+
Killer Killiani test	+	+	+
Test for Terpenoids			
	+	+	+
Tests for Tannins			
Ferric chloride test	-	+	+
Lead acetate test	-	+	+
Tests for Steroids			
Libermann-Burchard test	+	+	+
Salkowski's test	+	+	-
Carbohydrates			
Molish's Test	+	+	+
Benedict's Test	+	+	+
Bradford's test	+	+	+

RESULTS AND DISCUSSION

Table no. 2 Phytochemical analysis of the leaves of *Spilanthes acmella* Murr

Plant extract	Alkaloids	Glycosides	Tannins	Flavonoids	Terpenoids	Phlobatannis
Petroleum ether extract	-	-	-	+	+	-
Ethanol extract	+	-	+	-	-	-
Methanolic extract	+	+	-	+	+	-
Aqueous extract	+	+	+	+	-	+

Key: (-) =Negative, (+) = Positive

Table no.3 Phytochemical analysis of the Flower of *Spilanthes acmella* Murr

Plant extract	Alkaloids	Glycosides	Tannins	Flavonoids	Terpenoids	Phlobatannis
Petroleum ether extract	-	-	-	+	+	-
Ethanol extract	+	-	-	-	-	-
Methanolic extract	+	-	-	+	+	-
Aqueous extract	+	+	+	+	-	+

Key: (-) =Negative, (+) = Positive

These compounds are known to show curative activity against several pathogens and therefore not surprising that the plant extract is used traditionally to cure different diseases. The immunomodulator and antimicrobial properties of tannins have been reported^{10, 14}. Spilanthol alkamide are known for its potent pharmacological activity especially its clinical use as a potent analgesic along with the treatment of mouth diseases, rheumatism, hemorrhoids and paralysis etc.

CONCLUSION

The result obtained from the phytochemical screening of the leaves and flowers of *Spilanthes acmella* Murr are recorded in Table no.2 and Table no.3. These observations may be attributed to the nature of biologically active components Alkaloids, tannins, Flavonoids, Terpenoids, glycosides and phlobatannins. The main alkalamide in *Spilanthes acmella* is Spilanthol. Due to presence of Spilanthol, *Spilanthes* exerts local anesthetic and powerful insecticidal properties.

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