



## Research Paper

# Phytochemical Screening of *Spilanthes acmella* plant parts

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*Spilanthes acmella* leaf and root were investigated for its physicochemical and phytochemical screening. The whole plant of *Spilanthes acmella* (Family-Compositae) is reported to have good medicinal values in traditional system of medicines. The present study deals with physicochemical investigations of determination of loss on drying, foreign organic matter, moisture content, ash values (total ash, acid insoluble ash and water soluble ash), extractive values (ethanol soluble extractive, water soluble extractive), total carbohydrate, protein, and tannin contents were studied. Loss on drying and moisture content were found higher in leaf while foreign organic matter was found higher in root. Ash content analysis was showed that the higher percentage of ash content in root portion. Ethanol soluble extractive value was found higher in leaf and water soluble extractive value higher in root. Total carbohydrate percentage was found higher in leaf. However, protein, and tannin content were found higher in root portion of the plant. The preliminary phytochemical screening of *Spilanthes acmella* leaf and root were carried out by using qualitative chemical tests. The observations revealed the presence of alkaloids, carbohydrates, tannins, steroids, carotenoids, fats and fixed oils, sesquiterpenes and amino acids in different extracts of *Spilanthes acmella* plant parts.

**Key word:** *Spilanthes acmella*, phytochemical screening. Ash content, carbohydrate, protein, tannin,

## INTRODUCTION

India is one of the twelve-mega diversity countries in the world and has 17,000 flowering plants. Among the 25 hotspots in the world, the Eastern Himalayas and the Western Ghats are the two hotspots of India<sup>1</sup>. Herbal drugs play an important role in health care programs especially in developing countries. Ancient Indian literature incorporates a remarkably broad definition of medicinal plants and considers all 'plant parts to be

potential sources of medicinal substances<sup>2</sup>. However a key obstacle, which has hindered the acceptance of the alternative medicines in the developed countries, is the lack of documentation and stringent quality control. There is a need for documentation of research work carried out on traditional medicines<sup>3</sup>. 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 studies<sup>4</sup>. These

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studies help in identification and authentication of the plant material. Correct identification and quality assurance of the starting materials is an essential prerequisite to ensure reproducible quality of herbal medicine which will contribute to its safety and efficacy.

*Spilanthus acmella* commonly known as 'akarkara' is an annual hairy herb, up to 32-60 cm. tall with numerous stems of marigold yellow flowers. Stems are glandular and hairy with pungent taste. The whole plant is acrid in taste<sup>5</sup>. The leaves are used as immunomodulatory, adaptogenic, diuretic, tooth paste, lithotriptic, antiscorbutic, sailagogene, antibacterial, tonic and digestive<sup>6-9</sup>. The leaves contain alkaloids, carbohydrates, pungent amide tannins, steroids, carotenoids, provitamin A,  $\alpha$ -carotene and  $\beta$ -carotene, essential oils, sesquiterpenes, and amino acid<sup>10-16</sup>. Preliminary studies have reported as diuretic<sup>17</sup>, antiinflammatory and analgesic<sup>18</sup>, vasorelaxant and antioxidant<sup>19</sup>. There not much more data was found on its leaf and root phytochemical analysis. Therefore *Spilanthus acmella* plant parts were investigated for its phytochemical analysis

## MATERIALS AND METHODS

### Plant material

Leaf and root of *Spilanthus acmella* (Family-Compositae) collected from local

areas of Hubli, Karnataka (India) and authenticated by Dr. Ganesh Hegde, Professor and Head, Dept. of Botany, Karnataka University, Dharwad, Karnataka, dried in shade, crushed to coarse powder were used for studies.

The leaf and root were separately dried under shade and powdered by the help of mechanical process. The coarse powder of leaf and root have stored in airtight container for further studies. Chemicals used were research grade and purchased from Merck, Himedia, Lobachemie, Qualinems.

**Physicochemical Analysis:** Leaf and root were subjected to physicochemical study for determination of loss on drying, foreign organic mater, moisture content, ash values and extractive values using the methods described by Indian Ayurvedic Pharmacopeia<sup>20</sup>.

**Carbohydrate Analysis:** Total Carbohydrate of leaf and root were measured by Phenol Sulphuric Acid Methods described by Sadasivam and Manickam<sup>21</sup>.

**Protein Analysis:** Protein contents of leaf and root were measured by using Lowry's Method described by Sadasivam and Manickam<sup>21</sup>.

**Tannin Content Analysis:** Tannin content of leaf and root were analyzed using Folin-

Denis method, described by Sadasivam and Manickam<sup>21</sup>.

**Table-1: Physical Constants *Spilanthes acmella* plant parts.**

S. No.	Constant	Leaf (%)	Root (%)
1	Loss on drying	8.76±0.04	6.76±0.45
2	Foreign organic mater	0.13±0.10	0.23±0.13
3	Moisture content	4.32±0.06	3.10±0.26
4	Ash values		
	Total ash	7.3±0.21	9.5±0.01
	Acid insoluble ash	3.5±0.72	5.5±0.36
	Water soluble ash	2.0±0.05	4.0±0.02
5	Extractive values		
	Ethanol soluble extractive	21.2±0.23	16.5±0.64
	Water soluble extractive	11.2±0.25	18.2±0.05

**Preliminary Phytochemical Analysis:**

Qualitative screening of leaves and roots were performed for the identification of various classes of active chemical constituents using the methods described by Raman<sup>22</sup>, Harborne<sup>23</sup> and Wagner<sup>24</sup>.

**RESULTS AND DISCUSSIONS**

**Physicochemical Analysis:** The results of Loss on drying and moisture content were found higher in leaf (8.76% and 4.32%) while foreign organic mater was found higher in root (0.23%). Ash content analysis was showed that the higher percentage of ash content in root portion

(9.5%). Ethanol soluble extractive value was found higher in leaf (21.2%) and water soluble extractive value higher in root (18.2%) (**Table-1**). From the finding of extractive value of ethanolic has been selected for further studies.

**Carbohydrate Analysis:** Total Carbohydrate percentage was analyzed by phenol sulphuric acid methods. The finding showed leaf possesses higher percentage of sugar content (4.58%) as compared to root (3.68%).

**Protein Analysis:** The protein content was estimated by Lowry's method. Protein content was found higher in root portion (4.12%) as compared to leaf (3.41%).

**Tannin Content Analysis:** Tannins were estimated by Folin-Denis method. Results showed root possesses higher percentage (6.94%) of tannin as compared to leaf (3.06%).

**Preliminary Phytochemical Analysis:**

Qualitative phytochemical studies of leaf and root were performed on its ethanolic and aqueous extracts to identify its alkaloids, carbohydrates, tannins, steroids, carotenoids, fats and fixed oils, sesquiterpenes and amino acids by using suitable chemicals and reagents(**Table-2**). In the present study, these tests revealed the presence of alkaloids, carbohydrates tannins and carotenoids in aqueous extract of leaf and the presence of alkaloids,



**Table 2 Preliminary phytochemical analysis of different extracts of *Spilanthes acmella* plant parts.**

Chemical Constituents	Aqueous extract (leaf)	Ethanol extract (leaf)	Aqueous extract (root)	Ethanol extract (root)
Alkaloids	+	+	+	+
Carbohydrates	+	+	+	+
Flavonoids	-	-	-	-
Tannins	+	+	+	+
Amino acids	-	+	-	+
Glycosides	-	-	-	-
Steroids	-	+	-	-
Sesquiterpenes	-	+	-	+
Carotenoids	+	+	-	-
Fats and Fixed oils	-	+	-	-

carbohydrates and tannins in aqueous extract of root, while the presence of alkaloids, carbohydrates, tannins, fats and fixed oils, steroids, carotenoids, sesquiterpenes and amino acids in ethanol extract of leaf and the presence of alkaloids, carbohydrates, tannins, amino acids and sesquiterpenes in ethanol extract of root.

## CONCLUSION

Physicochemical studies finding possess total ash content has been higher in root and acid insoluble ash also higher in root, it may be due to the earth components. Extractive value has been found higher in root water extract; however ethanol extract has found higher in leaf. Total carbohydrate content has found higher in leaf however, protein and tannin content found higher in root portion of *Spilanthes*

*acmella*. The qualitative phytochemical screening showed that the plant is a rich source of alkaloids, carbohydrates, tannins, amino acids and sesquiterpenes.

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