

NATIONAL JOURNAL OF RESEARCH IN AYURVED SCIENCE

Article Received Date: 03/02/2025

Reviewed on Date: 25/03/2025

Accepted on: 22/04/2025

Phytochemical Evaluation of Ethanol Extract of *Withania somnifera* (*Ashwagandha*) Root Powder – Comparative Study

Ketaki Pandurangrao Gavle

Assistant Professor, Department of Dravyaguna, CSSS Ayurved Mahavidyalaya, Chhatrapati
Sambhajinagar, Maharashtra, India

Author Correspondence: ketakig85@gmail.com

Abstract

Withania somnifera (L.) *Dunal*, or *Ashwagandha*, is renowned for its adaptogenic and neuroprotective properties in Ayurveda. This study undertook a preliminary phytochemical screening of its ethanol root extract using standard qualitative assays. The presence of alkaloids, steroids, anthraquinone glycosides, and reducing sugars was confirmed, while flavonoids, phenolics, and saponins were not detected. These findings were compared with standard reference values and previous studies to understand extraction efficiency and compound-specific solvent compatibility. Ethanol proved effective for specific secondary metabolites but selective in nature.

Keywords

Withania somnifera, *Ashwagandha*, phytochemicals, ethanol extract, alkaloids, standard comparison, Soxhlet method

Introduction

Withania somnifera (Family: *Solanaceae*), commonly called *Ashwagandha*, is a cornerstone of Ayurvedic *Rasayana* therapy and has been used traditionally for vitality, longevity, and stress relief [1]. Its pharmacological effects are attributed to bioactive constituents such as withanolides, alkaloids, flavonoids, saponins, and steroids [2].

Preliminary phytochemical screening is a crucial step for understanding the therapeutic potential of plants. The present study aimed

to analyze the phytoconstituents extracted using ethanol from *Ashwagandha* root and compare these findings with standard literature [3,4].

Materials and Methods

Materials

- Plant Material: Dried root powder of *Withania somnifera* – 50 g
- Solvent: Ethanol (95% analytical grade)
- Extraction Method: Soxhlet extractor (12 hrs at ~60–70°C)
- Phytochemical Tests: *Dragendorff's*

Wagner's, Shinoda, Salkowski, Benedict's, Frothing, Borntrager's, etc. [4,5]

Phytochemical Screening

Standard qualitative assays were conducted for the following constituents:

- Alkaloids
- Flavonoids
- Steroids
- Phenolic compounds
- Saponins
- Reducing sugars
- Anthraquinone glycosides

Results – Comparative Phytochemical Constituents

Phytochemical Class	Observation (This Study)	Standard Findings*	Comparative Inference
Alkaloids	Present (Wagner's: reddish-brown ppt)	Commonly present in all extracts (polar & non-polar) [2,6]	Ethanol effective; aligns with known literature
Flavonoids	Absent (no color in Shinoda test)	Frequently present in hydroalcoholic/aqueous extracts [1,2]	Likely missed due to solvent polarity
Steroids	Present (Salkowski: red chloroform layer)	Reported in both alcohol and chloroform extracts [6]	Confirmed; matches standard extraction results
Phenolic Compounds	Absent (no ppt or blue-black color)	Detected mostly in water or methanol-based extracts [4,8]	Ethanol not optimal for phenolic extraction
Saponins	Absent (no persistent froth)	Generally detected in aqueous and	Ethanol extraction not effective

		hydroalcoholic media [2,4]	
Reducing Sugars	Present (green-yellow in <i>Benedict's</i>)	Typically present in polar solvent extractions [5]	Confirmed; ethanol adequate
<i>Anthraquinone Glycosides</i>	Present (pink-red in Borntrager's test)	Less frequently reported; dependent on species part and solvent [7]	Notable detection; may support unique pharmacological role

*Standard findings drawn from refs [1–8]

Discussion

Ethanol proved effective for extracting alkaloids, steroids, reducing sugars, and anthraquinone glycosides from *W. somnifera* roots. These compounds contribute to *Ashwagandha's* adaptogenic, neuroprotective, and metabolic benefits [6]. The absence of flavonoids, phenolics, and saponins is likely due to ethanol's relatively lower polarity, as these compounds are more efficiently extracted by aqueous or methanol mixtures [2,4,8].

The detection of anthraquinone glycosides is relatively rare in *Ashwagandha* literature, suggesting either chemotypic variation or efficient extraction by ethanol under controlled conditions [7].

Conclusion

The ethanol extract of *Withania somnifera* root demonstrated the presence of alkaloids, steroids, reducing sugars, and anthraquinone glycosides. In contrast, flavonoids, phenolics, and saponins were not detected. These results align partially with standard findings and highlight the influence of solvent polarity on phytochemical outcomes. Ethanol is validated for moderate polarity compounds, but broader profiling would benefit from additional solvent systems such as water or methanol.

References

1. Mishra L, Singh BB, Dagenais S. Scientific basis for the therapeutic use of *Withania somnifera* (*Ashwagandha*): A review. *Altern Med Rev.* 2000;5(4):334–46.

2. Singh N, Bhalla M, de Jager P, Gilca M. An overview on *Ashwagandha*: A Rasayana (rejuvenator) of Ayurveda. Afr J Tradit Complement Altern Med. 2011;8(5 Suppl):208–13.
3. Khandelwal KR. Practical Pharmacognosy: Techniques and Experiments. 19th ed. Pune: Nirali Prakashan; 2008.
4. Harborne JB. Phytochemical Methods: A Guide to Modern Techniques of Plant Analysis. 3rd ed. Berlin: Springer Science & Business Media; 1998.
5. Trease GE, Evans WC. Pharmacognosy. 15th ed. Edinburgh: Saunders Elsevier; 2002.
6. Kulkarni SK, Dhir A. *Withania somnifera*: An Indian ginseng. Prog Neuropsychopharmacol Biol Psychiatry. 2008;32(5):1093–105.
7. Al-Qura'n S. Ethnopharmacological survey of wild medicinal plants in Showbak, Jordan. J Ethnopharmacol. 2009;123(1):45–50.
8. Cowan MM. Plant products as antimicrobial agents. Clin Microbiol Rev. 1999;12(4):564–82.

Conflict of Interest: None



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Source of funding: Nil

Cite this article:

Phytochemical Evaluation of Ethanol Extract of Withania somnifera

(Ashwagandha) Root Powder – Comparative Study

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Ayurlog: National Journal of Research in Ayurved Science- 2025; (13) (02): 01-04