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Original Article

Phytochemical Characterization and Antioxidant Evaluation of Panchatikta Ghrita Guggulu Tablets: An Analytical Study

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ABSTRACT

Background: A classic Ayurvedic composition, Panchatikta Ghrita Guggulu tablets are well-known for their medicinal qualities, especially in the treatment of inflammatory conditions affecting the skin, bones, and joints. **Objectives:** The current study aimed to evaluate the physicochemical properties, microbiological purity, heavy metal safety, and antioxidant activity of Panchatikta Ghrita Guggulu pills to confirm their efficacy and safety. **Materials and Methods:** The physicochemical characteristics of hardness, pH, ash and extractive levels, friability, disintegration time, and drying loss were assessed. **Results:** Microbial tests confirmed the absence of harmful infections, with total bacterial and fungal counts falling within permissible limits. Heavy metal analysis revealed that levels of lead, mercury, arsenic, and cadmium were well within WHO and Ayurvedic Pharmacopoeia standards. Dose-dependent moderate to strong radical scavenging capacity was demonstrated by the DPPH assay, which gauges antioxidant activity. **Conclusion:** The results confirm that Panchatikta Ghrita Guggulu tablets meet quality standards for safety, purity, and medical efficacy. This comprehensive evaluation highlights the importance of stringent quality control protocols in guaranteeing the therapeutic effectiveness and global acceptance of Ayurvedic drugs.

Keywords: Antioxidant Activity, DPPH Assay, Microbiological Analysis, Panchatikta Ghrita Guggulu, Physicochemical Evaluation, Quality Control.

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INTRODUCTION

A traditional Ayurvedic composition, Panchatikta Ghrita Guggulu tablets are used to treat inflammatory conditions that impact the skin, bones, and joints. Guggulu (*Commiphora wightii*) and medicated Ghrita are blended with five Tikta (bitter) herbs-Guduchi (*Tinospora cordifolia*), *Patola* (*Trichosanthes dioica*), Kantakari (*Solanum xanthocarpum*), Vasa (*Adhatoda vasica*), and Neem (*Azadirachta indica*). The medicated ghee used to treat the diseases of Vataroga, Sandhigata Vata, Asthimajjagata Vata, and Kushta (Kariga 2021).

To assess efficacy, purity, and safety in light of the growing demand for Ayurvedic medications, strong quality standards must be established. As a result, this study assessed the Panchatikta Ghrita Guggulu tablets for physicochemical characteristics, microbiological purity, heavy metal content, phytochemical composition, and antioxidant activity. This study was conducted to assess the phytochemical composition, quality, and safety of Panchatikta Ghrita Guggulu tablets.

MATERIALS AND METHODS

Materials

The Panchatikta Ghrita Guggulu tablets (Batch No. DU232404) were purchased from Shree Dhootapapeshwar Ltd., an Ayurvedic producer with GMP certification.

Methods

OM Pharmaceuticals Limited carried out heavy metal, physicochemical and microbiological safety analyses. The Central Research Facility, AYUSH-approved Drug Testing Laboratory for ASU Drugs, KAHER's Shri BMK Ayurveda Mahavidyalaya, Belagavi, was used to estimate antioxidant activity and total phenolic content.

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Organoleptic Evaluation of Panchatikta Ghrita Guggulu tablet includes form, colour, taste, and odour. The following standard parameters were used to assess the Physicochemical parameters like pH (Government of India, 2008 Part II, Vol. 2 1st ed., p. 225), ash values (Government of India, 2008 Part II, Vol. 2 1st ed., p. 160), extractive values (Government of India, 2008 Part II, Vol. 2 1st ed., p. 160), TLC fingerprinting (Government of India, 2008 Part II, Vol. 2 1st ed., p. 164), hardness (Boshhiha AM, 2018), friability (Boshhiha AM, 2018), disintegration time (United States Pharmacopeia (USP), 2019), and loss on drying (Table 1). The Microbial Limit Test (Ministry of Health, Labour and Welfare, Japan. (n.d.)) was used to identify the overall microbial load and microbial contamination (Table 2). Heavy Metal Analysis (Pb, Hg, As, and Cd) was performed using AAS (Sardans, 2010). The Folin–Ciocalteu technique was used to calculate the total phenolic content, which was then represented as gallic acid equivalents (mg GAE/g). (Laoung-on J) Ascorbic acid was used as the standard in the DPPH radical scavenging experiment to assess antioxidant activity (Brand-Williams *et al.*, 1995).

RESULTS

The results of the organoleptic and physicochemical parameters comply the standard guidelines. The results are tabulated in Table 1.

Microbial analysis of Panchatikta ghrita Guggulu tablet shows that the total bacterial and fungal counts were within API and WHO allowed limits, confirming the absence of hazardous infections by microbial analysis, the results were incorporated in Table 2.

Heavy metal analysis

Analysis of heavy metals showed that cadmium (<0.1 ppm), lead (0.374 ppm), mercury (0.21 ppm), and arsenic (0.34 ppm) were all within acceptable safety limits.

Total Phenolic Analysis

The extract's total phenolic content was 12.08 ± 0.32 mg GAE/g (Table 3).

A dose-dependent radical scavenging action was shown by antioxidant activity, with the highest inhibition (81.23%) occurring at 1000 µg/mL. Table 4 shows the results of the 2,2-Diphenyl-1-picrylhydrazyl (DPPH) assay used to assess the antioxidant activity of Panchatikta Ghrita Guggulu tablets (Table 4).

DISCUSSION

Panchatikta Ghrita Guggulu tablets were found to fulfill acceptable requirements for Ayurvedic formulations based on the physicochemical parameters. Pharmaceutical stability and appropriateness for therapeutic use are indicated by low moisture content, sufficient hardness, and total disintegration within 28 min. TLC fingerprinting verified the components' genuineness, and extractive values point to a robust phytoconstituent profile.

The microbiological safety ensures by the absence of *E. coli, Pseudomonas aeruginosa, Salmonella* and *Staphylococcus aureus*. The formulation's safety for ingestion was confirmed by the total microbial and fungal counts, which were well within acceptable limits.

The measured heavy metals (Pb, Hg, As, and Cd) were found to be well within WHO and API requirements by heavy metal analysis. This assures that the formulation is safe for long-term therapeutic usage and free of toxicological hazards.

The presence of phenolic compounds, which are known for their anti-inflammatory, antioxidant, and free radical scavenging properties, was confirmed by the hydroalcoholic extract's total phenolic content of 12.08 ± 0.32 mg GAE/g extract.

Table 1: Physicochemical analysis of Panchatikta Ghrita Guggulu tablet.

Test	Observation	Limits
Loss on drying (105°C),	4.24% w/w	Yellowish Brown to dark brown colour, round bioconvex coated tablet having SDL mark on one side
Friability	0.00% w/w	Not more than 8% w/w
disintegration time	28 min	Not more than 1% w/w
hardness	4.8 kg/cm^2	Not less than 1.5 kg/cm^2
Thickness	5.13 mm	5.0 +/- 0.5 mm
pH (1% aqueous solution)	6.07	5.0 – 7.0
Ash	22.62% w/w	Not more than 25% w/w
acid-insoluble ash	2.25% w/w	Not more than 3% w/w
water-soluble extractive	52.48% w/w	Not less than 35% w/w
alcohol- soluble Extractive	27.12% w/w	Not less than 11% w/w
TLC fingerprinting	Complies	Unique fingerprints comparable to standard TLC

Table 2: Microbial limit test of Panchatikta Ghrita Guggulu tablet.

specified Micro-Organisms	Results
E. coli Absent	Absent/g
P. aeruginosa	Absent/g
Salmonella sp.	Absent/g
Staphylococcus sp.	Absent/g
Total Microbial Plate Count (TPC)	$2.1X10^3$ c.f.u./g
Total Yeast and Mould Count (TYMC)	<10 c.f.u./g

Table 3: Total Phenolic Content.

Extract	Concentrations (mg)			Mean Concentration Result
Hydro-alcoholic Extract (cold)	I	II	III	(12.08 ±0.32) mg GAE/g of Extract, GAE-Gallic Acid Equivalent
	12.42	12.05	11.78	

Table 4: Antioxidant activity of Panchatikta Ghrita Guggulu tablet.

Concentration µg/mL	% Radical Scavenging activity
31.25	59.20
62.5	58.93
125	60.79
250	63.74
500	71.53
1000	81.23

The results of the DPPH showed a definite capacity for radical scavenging that was dose dependent. The effect increased significantly at increasing dosages (71.53% at 500 µg/mL and 81.23% at 1000 µg/mL), however modest activity was observed at lower concentrations (59–61% inhibition at 31.25–125 µg/mL).

The poly herbal formulation's phenolic chemicals, flavonoids, and bioactive phyto constituents work in concert to provide the reported antioxidant activity. These results corroborate the traditional claims made by Panchatikta Ghrita Guggulu in the treatment of degenerative and inflammatory disorders in which oxidative stress is a major factor.

CONCLUSION

The present study demonstrates that Panchatikta Ghrita Guggulu tablets meet all required safety, effectiveness, and quality standards. The pharmaceutical stability and safety of the formulation were validated by physicochemical, microbiological, and heavy metal studies. Its traditional medicinal uses in inflammatory and degenerative diseases are further supported by its high phenolic content and noteworthy antioxidant capability. In order to assure the safe integration of Ayurvedic medicines into contemporary healthcare systems, this thorough study emphasises the significance of strict quality control and scientific validation.

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ABBREVIATIONS

WHO: World Health Organisation; **DPPH assay:** 2,2-Diphenyl-1-picrylhydrazyl assay; **GMP:** Good Manufacturing Practices; **AYUSH:** Ayurveda, Yoga & Naturopathy, Unani, Siddha, and Homeopathy; **TLC:** Thin Layer Chromatography; **Pb:** Lead; **Hg:** Mercury; **As:** Arsenic; **Cd:** Cadmium; **AAS:** Atomic Absorption Spectroscopy; **GAE:** Gallic Acid Equivalent.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

SUMMARY

Panchatikta Ghrita Guggulu is an Ayurvedic formulation used for inflammatory conditions. It contains Guggulu along with five bitter herbs (Guduchi, Patola, Kantakari, Vasa, and Neem) processed in medicated ghee. To evaluate its quality, safety, and therapeutic potential, commercially manufactured tablets were analyzed for physicochemical properties, microbial contamination, heavy metal content, phytochemicals, and antioxidant activity.

Organoleptic and physicochemical parameters complied with standard guidelines, microbial testing confirmed the absence of harmful pathogens, and total microbial load was within permitted limits. Heavy metal analysis showed that levels of lead, mercury, arsenic, and cadmium were below WHO and API safety thresholds.

Phytochemical evaluation revealed a total phenolic content of 12.08 ± 0.32 mg GAE/g. Antioxidant activity, assessed by

the DPPH assay, demonstrated dose-dependent free radical scavenging, showing maximum inhibition (81.23%) at 1000 µg/mL. These results support the formulation's antioxidant and therapeutic properties.

Overall, Panchatikta Ghrita Guggulu tablets meet essential standards for safety, quality, and efficacy. The study validates the traditional claims of its use in inflammatory and degenerative disorders and highlights the importance of systematic quality control for Ayurvedic medicines.

REFERENCES

Boshhiha, A. M., Elhssony, F. M., & Diryaq, M. O. (2018). Evaluation of promethazine tablets available in Libyan markets. International Journal of Research in Pharmacology & Pharmaceutical Sciences, 3(1), 21–22.

Brand-Williams, W., Cuvelier, M. E., & Berset, C. (1995). Use of a free radical method to evaluate antioxidant activity. LWT – Food Science and Technology, 28, 25–30.

Government of India. (2008). The Ayurvedic Pharmacopoeia of India (Part II, Vol. 2 1st ed., p. 225). Controller of Publications.

Government of India. (2008). The Ayurvedic Pharmacopoeia of India (Part II, Vol. 2 1st ed., p. 160). Department of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy (AYUSH).

Government of India. (2008). The Ayurvedic Pharmacopoeia of India (Part II, Vol. 2 1st ed., p. 164). Department of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy (AYUSH).

Karigar, S. B. (2021). Classical utility of Panchatikta Guggulu Ghrita in its indications – Literary review. International Ayurvedic Medical Journal. Retrieved June 2021 from http://www.iamj.in/posts/images/upload/1266_1273.pdf

Laoung-on, J., Jaikang, C., Saenphet, K., & Sudwan, P. (2021). Phytochemical screening, antioxidant and sperm viability of Nelumbo nucifera petal extracts. Plants, 10, 1375.

Ministry of Health, Labour and Welfare, Japan. (n.d.). Microbial limit test. Retrieved from https://jpdb.nihs.go.jp/jp14e/14data/General_Test/Microbial_Limit_Test.pdf

Sardans, J., Montes, F., & Peñuelas, J. (2010). Determination of As, Cd, Cu, Hg and Pb in biological samples by modern electrothermal atomic absorption spectrometry. Spectrochimica Acta Part B: Atomic Spectroscopy, 65(2), 97–112. https://doi.org/10.1016/j.sab.2009.11.009

United States Pharmacopeia (USP). (2019). General chapter - Ayurvedic medicine. Retrieved from https://www.usp.org/sites/default/files/usp/document/harmonization/gen-chapter/april-2019-m99460.pdf

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