



Research Article

NUTRACEUTICAL EVALUATION OF *KUSHMANDA* GRANULES: A NATURAL SOURCE OF L-ARGININE, ANTIOXIDANTS, AND MINERALS FOR MATERNAL AND WOMEN'S HEALTH

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ABSTRACT

Ayurveda recognizes *Ahara* as a fundamental pillar of health, comparable to the modern concept of nutraceuticals that combine nutritional and therapeutic benefits. *Kushmanda* (*Benincasa hispida*), described in classical texts as *Madhura*, *Sheeta*, *Snigdha*, and *Brimhana*, possesses *Balya*, *Rasayana*, and *Pushtiprada* properties, suggesting its potential in maternal and women's health. The present study evaluated the nutraceutical composition of *Kushmanda* granules developed from *Kushmanda* pulp, *Go-Ghrita*, and *Sharkara* in equal proportions. Analytical evaluation was carried out at Lilaba Analytical Laboratories, Surat, following AOAC (2020) standards. The formulation showed carbohydrate (91.03%), protein (3.92%), and fat (2.56%) content, with essential minerals such as potassium (932.49mg/kg), calcium (504.15mg/kg), magnesium (20.31mg/100g), and zinc (18.93mg/kg). Vitamin C (23.8mg/100 g), vitamin E (3.58mg/100g), and L-Arginine (0.352%) were also detected. These findings highlight *Kushmanda* granules as a nutrient-dense Ayurvedic formulation with natural L-Arginine, antioxidants, and vital minerals. Its composition supports maternal nutrition, uteroplacental circulation, and oxidative balance, reflecting the *Rasayana* concept in modern nutritional science. The preparation may serve as a safe and natural supplement for maternal and women's health, offering an integrative link between traditional dietetics and contemporary nutraceutical research.

INTRODUCTION

The concept of *Ahara* as both preventive and promotive medicine has been deeply embedded in Ayurvedic tradition. Charaka Samhita describes *Ahara* as one of the *Traya Upasthamba*,^[1] essential for physical and psychological stability. Modern nutrition science echoes this through the concept of 'nutraceuticals,' substances derived from food sources that provide both nutritional and therapeutic benefits.

Among Ayurvedic plants, *Kushmanda* (*Benincasa hispida*) commonly known as ash gourd or winter melon has long been appreciated for its *Vrushya* and *Balya* qualities. Classical texts such as Sushruta Samhita, Bhavaprakasha Nighantu, and Raja Nighantu describe it as *Madhura*, *Sheeta*, *Guru*, *Snigdha*, *Pushtiprada*, *Sravadoshahara*, *Brimhana*, *Vrushya*, *Deepan* and useful in *Pitta-Vata* disorders, *Daha*, *Trishna*, and *Garbhasthapana*.^[2,3,4] Its pulp is considered nourishing, cooling, and hydrating, directly influencing *Rasa Dhatu* and *Ojas*. In modern pharmacology, *Kushmanda* is known to contain polysaccharides, amino acids, vitamins and essential minerals.^[5] These components contribute to its antioxidants, anti-inflammatory and hydrating properties. In context to maternal health, maintaining adequate fluid and nutrient balance is essential for optimal uteroplacental circulation and

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fetal nourishment. Hence, development and evaluation of *Kushmanda* as a natural nutraceutical formulation represents a meaningful step toward evidence-based validation of traditional formulation.

MATERIALS AND METHODS

Preparation of *Kushmanda* Granules

Kushmanda (*Benincasa hispida*) granules were prepared following a standardized method to preserve bioactive constituents. Fruit pieces were cut, boiled until translucent, and concentrated by removing excess water to yield *Kushmanda Pishti*. The *Pishti* was lightly roasted in ghee to reduce moisture and enhance stability, then blended with sugar syrup (*Kushmanda: Sharkara*, 1:1) of 2-string consistency. The mixture was continuously stirred to ensure uniform granulation and passed through sieve No. 22 to obtain homogenous granules. The granules were dried under controlled mild conditions and stored in airtight containers. This preparation method helps retain key bioactive compounds, including polysaccharides, antioxidants, and micronutrients, thereby supporting the nutraceutical potential of *Kushmanda* granules for functional health applications.

The ratio of ingredients was: *Kushmanda* pulp – 1 part; *Go-Ghrita* – Q.S.; *Sharkara* – 1 part

Analytical Evaluation

Samples of *Kushmanda* granules were analyzed at Lilaba Analytical Laboratories, Surat, Gujarat (Report No. LAL-ASU-021025001). Parameters assessed included macronutrients (total fat, saturated fat, total carbohydrates, dietary fiber, protein, cholesterol, sodium, and potassium), vitamins (A, B6, B3, C, and E), minerals (calcium, magnesium, phosphorus, zinc, iron, manganese, and iodine), and amino acid profiling with emphasis on L-Arginine content. L-Arginine was quantified by HPLC, while mineral estimation (Ca, Fe, K, Mg, Zn, P, Mn) was performed using ICP-OES. Standard physicochemical tests including loss on drying, total ash, pH, and appearance were also carried out. Nutrient values were expressed as mg/kg or mg/100 g, and all analyses were conducted according to AOAC (2020) protocols, ensuring accurate and reproducible results.

RESULTS

The formulation appeared light brown, with a characteristic sweet odour and pleasant taste. The granules were spherical, uniform, and free from microbial contamination.

Table 1: Nutritional and Amino Acid Profile of *Kushmanda* Granules

Parameters	Test Name	LOQ	Results	Test Method
Macro Nutrients	Fat. %	0.10	2.56	LAL/CHEM/SOP/PCA/04
	Saturated fat, %	0.50	BLQ	LAL/CHEM/TOP/FD/GC/02
	Proteins, %	0.50	3.92	LAL/CHEM/SOP/PCA/23
	Carbohydrate, %	0.50	91.03	LAL/CHEM/SOP/PCA/20
	Cholesterol, mg/100gm	0.50	BLQ	LAL/CHEM/SOP/FD/GC/02
	Dietary Fiber, gm/100gm	0.10	BLQ	LAL/CHEM/SOP/PCA/22
Minerals	Sodium (as Na), mg/kg	0.50	436.02	LAL/CHEM/SOP/PCA/13
	Potassium (as K), mg/kg	0.50	932.49	LAL/CHEM/SOP/PCA/13
	Iron (as Fe), mg/kg	1.00	BLQ	LAL/CHEM/SOP/PCA/13
	Calcium (as Ca), mg/kg	0.50	504.15	LAL/CHEM/SOP/PCA/13
	Zinc (as Zn), mg/kg	0.50	18.93	LAL/CHEM/SOP/PCA/13
	Manganese, mg/100gm	0.50	BLQ	LAL/CHEM/SOP/PCA/13
	Magnesium, mg/100gm	0.50	20.31	LAL/CHEM/SOP/PCA/13
	Phosphorus, mg/100gm	0.50	6.99	LAL/CHEM/SOP/PCA/13
	Iodine, mg/100gm	1.00	BLQ	By Titrimetric method
Vitamins	Vitamin A, µg/100gm	5.00	BLQ	IS 5886: 1970
	Vitamin C, mg/100gm	1.00	23.8	IS 5838: 1970

	Vitamin E, mg/100gm	0.50	3.58	IS 7235: 1974
	Niacin (Vitamin B3), mg/100gm	0.10	0.59	IS 5400
	Vitamin B6, mg/100gm	0.01	0.063	IS 7530
Amino Acid	L-Arginine, %	0.10	0.352	By Titrimetric method

*LOQ= Limit of quantification; * BLQ= Below limit of quantification

DISCUSSION

The present study confirms that *Kushmanda* Granules are a nutrient-dense formulation, containing significant levels of natural L-Arginine, essential minerals (Ca, K, Mg, Fe, Zn, P), and select vitamins (C and E). From a modern nutritional perspective, L-Arginine plays a critical role as a substrate for endothelial nitric oxide synthase, facilitating nitric oxide (NO) production. NO is a potent vasodilator, improving uteroplacental blood flow, tissue oxygenation, and microcirculation.^[6] This property is particularly relevant in obstetric practice, where compromised uteroplacental perfusion can contribute to conditions such as oligohydramnios, intrauterine growth restriction (IUGR), and preeclampsia. Supplementation with L-Arginine-rich formulations has been reported to support amniotic fluid volume and fetal growth^[7], highlighting a potential clinical application for *Kushmanda* Granules in prenatal care. High levels of potassium and magnesium contribute to electrolyte homeostasis and cellular hydration, essential for maternal cardiovascular stability and neuromuscular function. Iron and zinc are vital for haematopoiesis and antioxidant defence, mitigating oxidative stress- a significant contributor to complications in pregnancy^[8,9] Vitamins C and E act as antioxidants, protecting cellular membranes and supporting immune function, which may be especially beneficial during gestation.

From an Ayurvedic perspective, *Kushmanda* is classified as *Madhura Rasa*, *Sheeta Virya*, *Snigdha Guna*, with *Balya*, *Rasayana*, *Pittashamana*, and *Pushtiprada* properties. The combination with *Go-Ghrita* enhances bioavailability and *Rasayana* effects, while *Sharkara* contributes to energy, palatability, and stability.

Considering the nutraceutical composition, *Kushmanda* Granules could serve as an adjunctive intervention in gynaecological and obstetric practice. In addition to managing oligohydramnios, the formulation may benefit conditions associated with nutritional deficiencies, oxidative stress, and inadequate maternal nourishment, complementing standard prenatal care.^[10] Its antioxidant and

mineral-rich profile suggest potential prophylactic utility in early pregnancy to support placental function and fetal growth, as well as postnatal recovery and general women's wellness. Future research may focus on bioavailability, dose optimization, and clinical validation for other maternal health outcomes, extending beyond oligohydramnios to general wellness, micronutrient supplementation, and antioxidant support. The additions relate to the role of *Go-Ghrita* as *Samskara-anuvartana* and the significance of calcium in reducing the risk of preeclampsia.

CONCLUSION

Kushmanda Granules are a nutrient-rich Ayurvedic formulation with L-Arginine, essential minerals, and antioxidant vitamins. They support maternal nutrition, systemic rejuvenation, and women's wellness, bridging Ayurvedic *Rasayana* principles with modern nutraceutical science. The formulation is safe, stable, and holds potential as a natural supplement for maternal and women's health beyond oligohydramnios management.

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