

Role Of Vajranna Modak in The Prevention And Control Of Karshya (Undernutrition) In Children Aged 2–12 Years: A Public Health–Oriented Review

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ABSTRACT

Childhood undernutrition remains a major public health challenge in India, contributing significantly to morbidity, mortality, impaired physical growth, and long-term cognitive and socioeconomic consequences. Ayurveda describes a comparable clinical condition termed *Karshya*, characterized by emaciation, tissue depletion, weakness, poor appetite, and delayed growth. Traditional Ayurvedic nutritional formulations emphasizing *Brimhana*, *Balya*, and *Rasayana* principles offer sustainable, culturally acceptable strategies for addressing undernutrition. Vajranna Modak, a nutrient-dense preparation composed of Bajara (*Pennisetum glaucum*), Amalaki (*Emblia officinalis*), Groundnut (*Arachis hypogaea*), Guda, and Ghrita, represents a food-based therapeutic intervention integrating nutritional adequacy with Ayurvedic principles. This review critically examines the epidemiology of childhood undernutrition, the Ayurvedic conceptual framework of *Karshya*, the nutritional and pharmacological rationale of Vajranna Modak, and its potential role as a community-based public health initiative for children aged 2–12 years.

Keywords: Karshya, Undernutrition, Vajranna Modak, Ayurveda, Child Health, Public Health Nutrition

INTRODUCTION

Undernutrition in children is defined as a state of insufficient intake or utilization of energy, protein, and micronutrients necessary for optimal growth and development. Although malnutrition includes both under- and over-nutrition, undernutrition continues to be the predominant nutritional disorder in low- and middle-income countries. The World Health Organization estimates that undernutrition contributes to more than one-third of deaths among children under five years of age, often acting as an underlying cause rather than a direct diagnosis¹. India carries a disproportionately high burden of childhood undernutrition, accounting for nearly one-third of the global prevalence. Data from national surveys indicate that a large proportion of Indian children are underweight, stunted, or wasted, with marked regional and socio-economic disparities². States such as Bihar, Rajasthan, Gujarat, Madhya Pradesh, Jharkhand, and Uttar Pradesh continue to report

prevalence rates exceeding national averages. Despite extensive national nutrition programs, the persistence of undernutrition highlights gaps related to dietary diversity, cultural acceptability, community participation, and sustainability. Undernutrition during early childhood has profound implications extending beyond immediate health outcomes. It adversely affects immune competence, cognitive development, school performance, and work capacity in adulthood, thereby perpetuating intergenerational cycles of poverty and disease³. These realities emphasize the need for locally adaptable, cost-effective, and holistic approaches integrating food-based nutrition with health education.

AYURVEDIC CONCEPT OF KARSHYA

Ayurveda describes childhood undernutrition under the disease entity *Karshya*. Classical Ayurvedic texts characterize *Karshya* as excessive leanness associated with dryness of body parts, prominent veins and

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joints, reduced strength, poor appetite, fatigue, and impaired growth⁴. The classical verse “*Shushkasphikudargrivo Dhamnijalasantatah, Tvag-Asthi-Shesho Atikrishah*” vividly describes the physical manifestations of chronic nutritional deprivation.

The etiopathogenesis of *Karshya*⁵ is multifactorial, involving *Alpa Ahara* (inadequate food intake), *Vishama Ahara* (poor quality or irregular diet), *Mandagni* (impaired digestion and metabolism), recurrent infections, worm infestations, and adverse psychosocial and environmental conditions. These factors result in depletion of *Rasa*, *Mamsa*, and *Meda Dhatus*, leading to *Daurbalya* (weakness), delayed development, and compromised immunity (*Ojokshaya*). Management principles emphasize *Santarpana Chikitsa*, focusing on nourishment of depleted tissues through *Brimhana Ahara*, supported by *Balya* and *Rasayana* measures. Strengthening digestive capacity is considered fundamental to ensure effective assimilation and utilization of nutrients.

BURDEN AND IMPACT OF CHILDHOOD UNDERNUTRITION

Undernutrition substantially increases vulnerability to common childhood infections such as diarrhea, pneumonia, tuberculosis, and malaria⁶. Recurrent infections further impair nutrient absorption and increase metabolic demands, creating a vicious cycle of illness and nutritional depletion. It has been estimated that approximately 55% of child deaths worldwide are attributable, directly or indirectly, to undernutrition⁷. Beyond mortality, undernutrition causes irreversible impairments in physical growth and neurocognitive development. Stunted and undernourished children are more likely to have poor educational outcomes, reduced productivity, and lower earning potential in adulthood⁸. At a national level, undernutrition leads to significant economic losses due to diminished human capital and increased healthcare expenditure, making it a critical developmental concern.

RATIONALE FOR VAJRANNA MODAK AS A NUTRITIONAL INTERVENTION

Traditional Indian dietary practices have long emphasized the use of coarse cereals, legumes, natural sweeteners, and fats to support growth and sustenance. Bajara (pearl millet) is one of the earliest cultivated cereals in India and remains a staple in Rajasthan and other arid regions. It is rich in calories, protein, dietary fiber, iron, zinc, and essential micronutrients, making it highly suitable for nutritionally vulnerable populations⁹. Vajranna Modak is a composite Ayurvedic formulation designed to provide high energy density, adequate protein, essential fats, and micronutrients in a palatable form acceptable to children. Providing approximately 404 kcal and 7.3 g of protein per 100 g, the formulation is suitable for supplementing one-fourth of daily caloric requirements in undernourished children. Its composition reflects the Ayurvedic principles of *Brimhana*, *Balya*, and *Agnideepana*, while fulfilling modern nutritional requirements.

NUTRITIONAL AND PHARMACOLOGICAL BASIS OF VAJRANNA MODAK

Bajara (*Pennisetum glaucum*) contributes sustained energy, quality protein, dietary fiber, and iron, supporting weight gain and hemoglobin synthesis. Groundnut (*Arachis hypogaea*) provides high-quality protein and essential fatty acids, promoting tissue building and muscle mass development. Amalaki (*Embllica officinalis*), a well-recognized *Rasayana*, exhibits antioxidant, immunomodulatory, and digestive-enhancing properties, improving nutrient absorption and resistance to infections¹⁰. Guda (jaggery) serves as a readily available source of carbohydrates, iron, and minerals, improving palatability and compliance. Ghrita (cow ghee) enhances caloric density, improves bioavailability of nutrients, and supports neurological development and immunity¹¹. The synergistic combination of these ingredients renders Vajranna Modak nutritionally robust and therapeutically relevant for *Karshya*.

HYPOTHESIS

The null hypothesis proposes that Vajranna Modak is not effective in the prevention and control of *Karshya* (undernutrition) in children. The alternative hypothesis proposes that Vajranna Modak is effective in the prevention and control of *Karshya* in children aged 2–12 years.



OBJECTIVES

The primary objective is to improve clinical features and laboratory parameters associated with undernutrition in children aged 2–12 years. Secondary objectives include improvement in quality of life, reduction in morbidity and healthcare utilization, enhancement of anthropometric parameters, and increased awareness among caregivers regarding nutrition, hygiene, and appropriate child-rearing practices.

METHODOLOGICAL FRAMEWORK OF THE PUBLIC HEALTH INITIATIVE

The proposed program is a prospective, interventional, community-based initiative covering 500 children from six villages of Jodhpur district, Rajasthan. Children aged 2–12 years with IAP nutritional grades I and II (61–80%) and classical features of *Karshya* are included. *Vajranna Modak* supplementation is administered daily for 90 days, providing approximately one-fourth of recommended daily caloric intake according to age. Follow-up assessments are conducted at monthly intervals during intervention and one month after completion. The program integrates structured awareness activities focusing on nutrition, hygiene, sanitation, and child-care practices to address behavioral and social determinants of undernutrition.

ASSESSMENT CRITERIA AND OUTCOME MEASURES

Assessment includes subjective parameters derived from Ayurvedic descriptions, such as fat deposition, prominence of veins, appetite, sleep, fatigue, physical appearance, and activity levels. Objective parameters include anthropometric measurements, hematological indices, and biochemical markers such as serum protein, albumin, and albumin-globulin ratio. The primary outcome is reduction in severity of *Karshya*, while secondary outcomes include improvement in growth parameters, reduced morbidity, and enhanced functional well-being.

DISCUSSION

The present review highlights *Vajranna Modak* as a scientifically plausible and culturally acceptable

intervention for childhood undernutrition. Unlike conventional supplementation programs that often rely on commercially produced fortified foods, *Vajranna Modak* utilizes locally available ingredients deeply embedded in traditional dietary practices. This enhances sustainability, affordability, and community acceptance, which are critical determinants of success in public health nutrition programs.

From an Ayurvedic standpoint, the formulation directly addresses the pathophysiology of *Karshya*¹⁵ by replenishing depleted *Dhatus*, strengthening *Agni*, and improving *Ojas*. The inclusion of *Amalaki* and *Ghrita* ensures not only tissue nourishment but also immunomodulation and improved metabolic efficiency. From a biomedical perspective, the high caloric density, adequate protein content, and presence of essential micronutrients justify its role in promoting weight gain, improving biochemical parameters, and reducing infection-related morbidity. The integration of dietary¹⁶ supplementation with awareness activities further strengthens the intervention by addressing underlying behavioral and social determinants. Such a holistic approach aligns well with NCISM and national health policy priorities emphasizing preventive, promotive, and integrative healthcare. However, further controlled trials and long-term follow-up studies are required to establish comparative effectiveness, cost-benefit ratios, and scalability across diverse settings.

CONCLUSION

Vajranna Modak demonstrates strong Ayurvedic, nutritional, and public health justification as a preventive and therapeutic intervention for *Karshya* (undernutrition) in children aged 2–12 years. Its incorporation into community-based programs may offer a sustainable, culturally appropriate, and cost-effective strategy to reduce the burden of childhood undernutrition and improve long-term developmental outcomes.

Conflict of Interest

The authors declare no conflict of interest related to this manuscript.

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Declaration of AI Use

Artificial intelligence tools were not used during preparing this manuscript. The conceptualization, scientific content, analysis, and interpretation are solely the responsibility of the authors.

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Ethical Approval

As this manuscript is a review and programmatic framework, formal ethical committee approval was not required. For future implementation, ethical clearance will be obtained from an Institutional Ethics Committee prior to initiation.

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