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Ayurvedic Nutritional and Phytotherapeutic Interventions for Karshya in Children: Mechanisms, Clinical Evidence, and Research Perspectives

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Abstract

Background: *Karshya* is an important nutritional disorder described in *Ayurveda*, characterized by inadequate nourishment and depletion of body tissues. In children, impaired nutritional status may adversely influence growth, development, immunity, and overall health. *Ayurvedic* management emphasizes restoration of nourishment through dietary measures and therapeutic approaches such as *Brimhana*, *Balya*, *Deepana-Pachana*, and *Rasayana*, along with appropriately selected phytotherapeutic interventions.

Objective: To critically review *Ayurvedic* nutritional and phytotherapeutic interventions for *Karshya* in children, focusing on their therapeutic rationale, potential mechanisms, clinical evidence, and future research perspectives.

Methods: Classical *Ayurvedic* concepts related to *Karshya* and its management were integrated with contemporary evidence on nutritional and phytotherapeutic interventions relevant to paediatric undernutrition. Available evidence was assessed with emphasis on therapeutic principles, mechanisms, anthropometric and clinical outcomes, and safety.

Results: *Ayurvedic* management of *Karshya* adopts a multidimensional approach involving correction of dietary inadequacy, optimization of digestion and nutrient assimilation, and administration of nourishing dietary and herbal interventions. Available clinical evidence suggests potential benefits of selected *Ayurvedic* interventions on appetite, weight gain, anthropometric parameters, and nutritional status. However, variations in diagnostic criteria, formulations, treatment duration, outcome measures, and study quality limit definitive conclusions.

Conclusion: *Ayurvedic* nutritional and phytotherapeutic interventions may offer a complementary framework for addressing *Karshya* in children through combined effects on digestion, assimilation, and tissue nourishment. Well-designed clinical trials using standardized interventions, validated paediatric growth indicators, objective outcome measures, and systematic safety assessment are required to establish their efficacy and translational relevance.

Keywords: *Karshya*; *Brimhana*; childhood undernutrition; phytotherapy; anthropometry.

1. Introduction

Childhood undernutrition remains a major global health concern, adversely affecting physical growth, immune competence, cognitive development, and survival. It encompasses distinct manifestations, including underweight, wasting, stunting, and micronutrient deficiencies.[1] According to the UNICEF–WHO–World Bank Joint Child Malnutrition Estimates 2025, approximately **150.2 million children under five were stunted and 42.8 million were wasted globally in 2024**, indicating that progress remains insufficient to achieve the global nutrition targets for 2030.[2]

In *Ayurveda*, *Karshya* represents a state of inadequate bodily nourishment characterized by diminished body mass and depletion of tissues. Classical descriptions associate its development with factors such as insufficient or inappropriate dietary intake and other *Apatarpana*-predominant influences. The therapeutic approach therefore emphasizes *Brimhana* (nourishing therapy), together with appropriate dietary measures and restoration of digestive and assimilative capacity. These principles provide a broader therapeutic framework in which nutritional replenishment is accompanied by measures intended to improve the utilization of nutrients.

In paediatric practice, *Karshya* has frequently been interpreted in the context of underweight and childhood undernutrition. However, these concepts should not be considered directly synonymous. Contemporary nutritional assessment differentiates **underweight (low weight-for-age), wasting (low weight-for-height), and stunting (low height-for-age)**, with underweight potentially reflecting wasting, stunting, or both.[1] This distinction is important when evaluating *Ayurvedic* interventions using standardized paediatric anthropometric outcomes.

Ayurvedic management of *Karshya* incorporates dietary interventions and medicinal substances possessing *Brimhana*, *Balya*, *Deepana-Pachana*, and *Rasayana* properties. Such interventions may potentially influence nutritional recovery through multiple pathways, including appetite regulation, digestion and assimilation, nutrient provision, metabolic support, and tissue nourishment. Nevertheless, traditional rationale alone cannot establish clinical efficacy, and these interventions require systematic evaluation using contemporary nutritional and paediatric outcome measures.

Despite growing clinical interest in *Ayurvedic* approaches to childhood *Karshya*, the available evidence remains heterogeneous with respect to diagnostic criteria, formulations, duration of intervention, and outcome assessment. Therefore, the present review critically examines ***Ayurvedic nutritional and phytotherapeutic interventions for Karshya in children***, focusing on their therapeutic rationale, potential mechanisms, available clinical evidence, and limitations, while identifying priorities for future research.

2. *Ayurvedic* Conceptual Framework of *Karshya*

Karshya represents a state of excessive leanness or inadequate bodily nourishment associated with depletion of body tissues. *Acharya Charaka* includes *Atikarshya* among the *Ashta Nindita Purusha*, indicating excessive leanness as an undesirable physical state with important health implications.[3]

2.1 Etiology and Pathogenesis

Classical descriptions associate *Karshya* with inadequate or irregular dietary intake, including *Alpashana* and *Vishamashana*, along with factors contributing to *Vata* aggravation and inadequate tissue nourishment.[3] The condition can also be understood within the broader concept of *Apatarpana*, where insufficient nourishment contributes to progressive depletion of *Dhatus*. [4]

The pathogenesis may be summarized as:

Nidana → *Vata* predominance and inadequate nourishment → impaired *Dhatu*
Poshana → *Dhatu Kshaya* → *Karshya*

Thus, the therapeutic approach to *Karshya* involves not only provision of nourishment but also restoration of appropriate digestion, assimilation, and tissue nutrition.

2.2 Therapeutic Principles

Brimhana is the principal nourishing therapeutic approach indicated for individuals with *Karshya*. It is included among the *Shadupakrama* described by *Acharya Charaka* and is intended to promote nourishment and restoration of depleted body tissues.[5] *Brimhana Dravyas* are predominantly characterized by *Guru*, *Sheeta*, *Mridu*, *Snigdha*, *Bahala*, *Sthula*, *Picchila*, *Manda*, *Sthira*, and *Shlakshna* properties.[5] Proper administration of *Brimhana* is described as promoting *Bala* and *Pushti* and alleviating manifestations associated with *Karshya*.[5]

Accordingly, the therapeutic approach to paediatric *Karshya* can be summarized as:

Correction of *Nidana* → Optimization of digestion and assimilation → *Brimhana*
 and *Balya* nutritional/phytotherapeutic interventions → Restoration of *Pushti* and
Bala

3. Nutritional Interventions in Paediatric *Karshya*

Dietary management forms the foundation of treatment for *Karshya*. The classical approach emphasizes *Brimhana Ahara* foods that provide adequate nourishment, promote *Dhatu Pushti*, improve *Bala*, and support restoration of body mass.[5] Nutritional intervention should be individualized according to *Agni*, age, digestive capacity, and severity of nutritional depletion rather than relying solely on increasing the quantity of food.

3.1 *Brimhana Ahara*

Classical *Brimhana* measures include nutritionally dense foods such as *Kshira* (milk), *Ghrita* (ghee), *Mamsa Rasa* (meat soup), *Shali* (rice), *Godhuma* (wheat), and other nourishing preparations.[5] These foods provide a combination of energy, proteins, fats, and other nutrients and may therefore contribute to increased energy and nutrient intake when appropriately incorporated into the child's diet. [6,7]

Milk and dairy products are particularly relevant because they provide high-quality protein, fat, calcium, and several micronutrients important for childhood growth.[6] Dietary fats increase the energy density of complementary foods and facilitate absorption of fat-soluble vitamins, making adequate fat intake important during periods of rapid growth.[7]

3.2 Nutritional Strategy

A practical nutritional strategy for paediatric *Karshya* should combine **adequate energy and protein intake with dietary diversity and age-appropriate feeding practices**. Current paediatric nutrition recommendations emphasize nutrient-dense foods, adequate meal frequency, responsive feeding, and inclusion of diverse food groups to support healthy growth and prevent nutrient deficiencies.[7]

From an integrative perspective, the classical concept of *Brimhana* can therefore be explored through measurable nutritional outcomes such as dietary energy and protein intake, weight gain, weight-for-age, BMI-for-age, mid-upper arm circumference, and other age-appropriate growth indicators. Such objective assessment is essential for determining whether traditional nutritional interventions produce clinically meaningful improvements in children with *Karshya*.

4. Phytotherapeutic Interventions in Paediatric *Karshya*

Phytotherapeutic management of *Karshya* primarily involves drugs and formulations possessing *Brimhana*, *Balya*, *Rasayana*, and, where required, *Deepana-Pachana* properties. Rather than acting solely as sources of calories, these interventions are traditionally intended to improve appetite and digestive capacity while supporting *Dhatu Poshana*, *Bala*, and restoration of body mass. Increasing clinical research has evaluated such interventions using anthropometric and nutritional outcomes in children.

4.1 *Ashwagandha* (*Withania somnifera*)

Ashwagandha is widely used as a *Balya*, *Brimhana*, and *Rasayana* drug and is particularly relevant in conditions characterized by *Karshya* and *Daurbalya*. A comparative clinical study in children aged 1–5 years evaluated *Ashvagandhadi Lehya* against *Grahanibeelu Leha* for *Karshya* associated with underweight. Both interventions produced improvements in appetite, body weight, height, and mid-arm circumference, although between-group differences for most anthropometric outcomes were not statistically significant.[8]

4.2 *Shatavari* (*Asparagus racemosus*)

Shatavari is traditionally recognized for its *Brimhana*, *Balya*, and *Rasayana* actions. Its potential role in *Karshya* is associated with supporting nourishment and restoration of depleted tissues. A clinical study involving 35 patients with *Karshya* reported significant improvement in clinical symptoms and anthropometric parameters, including BMI and mid-upper arm circumference, following three months of *Shatavari* administration.[9] However, the absence of a control group limits interpretation of its independent therapeutic effect.

4.3 Polyherbal Nutritional Formulations

Recent paediatric studies have increasingly evaluated multi-ingredient formulations combining *Brimhana* and *Balya* drugs with substances intended to support digestion and appetite. *Baladi Granules*, containing *Bala*, *Ashwagandha*, *Shatavari*, *Yashtimadhu*, and other ingredients, were evaluated as an adjunct to dietary management in a randomized controlled trial involving children with mild-to-moderate undernutrition. Compared with dietary management alone, supplementation produced greater improvements in body weight, mid-upper arm circumference, height, appetite, and selected clinical parameters.[10]

Similarly, *Priyalaadi Modaka* was evaluated in a randomized clinical study involving children aged 13–60 months with *Karshya*. Addition of the formulation to dietary guidance resulted in greater improvement in weight and several anthropometric parameters than dietary guidance alone, suggesting potential value as a nutritional-phytotherapeutic intervention.[11]

Collectively, these findings suggest potential benefits of selected *Ayurvedic* phytotherapeutic interventions in paediatric *Karshya*. Nevertheless, differences in formulations, diagnostic criteria, treatment duration, comparators, and anthropometric assessment limit direct comparison between studies. These interventions should therefore be interpreted as **emerging clinical evidence rather than established efficacy**, emphasizing the need for standardized and adequately powered paediatric trials.

5. Potential Mechanisms of Action

The therapeutic effects of *Ayurvedic* interventions in *Karshya* may involve complementary nutritional and pharmacological mechanisms. However, most mechanistic evidence is derived from experimental or adult studies and should not be directly extrapolated to undernourished children.

5.1 Improvement of Digestion and Nutrient Utilization

Ayurvedic management emphasizes correction of impaired *Agni* before or along with *Brimhana* therapy. From a contemporary perspective, efficient gastrointestinal function is essential for nutrient digestion, absorption, and utilization. Undernutrition itself may adversely affect intestinal barrier function, mucosal

immunity, and gut microbial composition, potentially limiting nutritional recovery despite adequate dietary supplementation.[12]

5.2 Nutritional and Anabolic Support

Brimhana foods and formulations may support weight gain primarily by increasing dietary energy and nutrient availability. Milk, *Ghrita*, cereals, and nutrient-dense formulations provide macronutrients required for growth and tissue synthesis. [5–7] When combined with *Balya* and *Brimhana* herbs, this nutritional foundation may contribute to improvement in body weight and anthropometric parameters, as observed in preliminary clinical studies. [8,10,11]

5.3 Adaptogenic and Metabolic Effects

Ashwagandha contains biologically active constituents, particularly withanolides, and has demonstrated adaptogenic, anti-inflammatory, antioxidant, and immunomodulatory activities in experimental and clinical research.[13] A systematic review of human studies also identified preliminary evidence for growth-promoting applications in children, although the authors emphasized the need for larger, standardized controlled trials.[14] These properties provide biological plausibility for its traditional use as a *Balya* and *Rasayana* intervention but do not independently establish efficacy in paediatric *Karshya*.

5.4 Antioxidant and Immunomodulatory Effects

Shatavari contains steroidal saponins, particularly shatavarins, together with flavonoids and other phytoconstituents associated with antioxidant, adaptogenic, and immunomodulatory activities.[15] Such actions may theoretically support physiological recovery in nutritionally vulnerable children; however, direct mechanistic evidence specifically demonstrating improved paediatric growth remains limited.

Thus, the potential benefit of *Ayurvedic* interventions in *Karshya* may arise from the combined effects of **nutrient provision, improved digestive and assimilative capacity, metabolic support, and selected phytopharmacological actions**. These mechanisms remain plausible rather than conclusively established and require validation in well-designed paediatric studies.

6. Clinical Evidence and Critical Appraisal

Clinical evidence for *Ayurvedic* interventions in paediatric *Karshya* is emerging but remains limited in methodological strength. Available studies have primarily evaluated changes in body weight, height, mid-upper arm circumference (MUAC), BMI, appetite, and classical symptoms of *Karshya*. The major clinical studies relevant to the present review are summarized below.

Table 1. Clinical Evidence for *Ayurvedic* Interventions in Paediatric *Karshya*

Intervention	Study design / Population	Duration	Major findings	Key limitation
<i>Baladi</i> Granules + dietary intervention [10]	Randomized controlled trial; 122 children aged 1-12 years with mild-to-moderate undernutrition	30 days	Greater improvement in weight, MUAC, height, appetite and clinical parameters compared with diet alone	Short intervention and follow-up period
<i>Grahanibeelu</i> <i>Leha</i> vs. <i>Ashvagandhadi</i> <i>Lehya</i> [8]	Randomized comparative study; 40 children aged 1–5 years	1 month	Both groups showed improvement in weight, height, MUAC and appetite-related parameters	Small sample; no placebo/usual-care control

<i>Priyalaadi Modaka</i> + dietary guidance [11]	Randomized clinical study; children aged 13–60 months	3 months	Improvement in anthropometric and clinical parameters compared with dietary guidance alone	Limited external validation
<i>Pathadi Churna</i> vs. protein powder [16]	Randomized comparative study; 30 undernourished children aged 3-6 years	60 days	Both interventions improved nutritional and clinical parameters	Small sample size and limited generalizability
<i>Ghanavyoshadi Khanda</i> vs. <i>Vidarikandadi Khanda</i> [17]	Randomized comparative clinical study in underweight children	30 days	Both formulations improved weight, height, MUAC, BMI and appetite-related parameters	Short duration and absence of untreated control
<i>Karshyaha</i> Yoga with <i>Ksheerbala Taila Matra Basti</i> [18]	Clinical study; 40 undernourished children	3 months	Improvements reported in anthropometric, clinical and selected laboratory parameters	Small study and combined intervention limits attribution of effect

Collectively, these studies suggest that *Ayurvedic* nutritional and phytotherapeutic interventions may improve selected anthropometric and clinical outcomes in children with *Karshya*. However, the evidence should be interpreted cautiously. Several studies involve relatively small samples, short intervention periods, heterogeneous formulations, variable diagnostic criteria, and differing outcome measures. [8,10,11,16-18]

An additional concern is the continued use of older percentage-of-expected-weight classifications in some trials rather than standardized age- and sex-specific growth indices. This complicates comparison across studies and limits translation of findings into contemporary paediatric nutritional practice. [8,10]

Overall, the available evidence provides a **preliminary clinical signal rather than definitive proof of efficacy**. Future studies should prioritize adequately powered randomized controlled designs, standardized formulations, appropriate comparator groups, validated anthropometric indices, dietary intake assessment, objective biochemical or functional outcomes, adverse-event monitoring, and longer follow-up.

7. Safety and Quality Considerations

Safety is particularly important when phytotherapeutic interventions are used in children because developmental differences in drug absorption, distribution, metabolism, and elimination may influence therapeutic response and susceptibility to adverse effects. Paediatric pharmacovigilance is therefore essential, especially where safety data from clinical trials are limited.[19]

Although the clinical studies discussed in this review generally suggest acceptable short-term tolerability of the evaluated *Ayurvedic* interventions, [8,10,11] the available sample sizes and treatment durations are insufficient to establish comprehensive paediatric safety. Published literature also documents adverse events associated with herbal medicine use in children, reinforcing the need for systematic reporting rather than assuming safety solely on the basis of traditional use.[20]

Quality of herbal preparations represents an additional consideration. Variability in botanical identity, raw materials, processing, formulation, and storage may affect the composition and reproducibility of phytotherapeutic products. Contamination with microorganisms, pesticides, mycotoxins, or heavy metals

may also compromise product safety. WHO therefore emphasizes standardized quality-control procedures for herbal materials and finished preparations.[21]

Future paediatric studies should consequently document **botanical authentication, formulation standardization, dose according to age or body weight where appropriate, manufacturing quality, treatment duration, concomitant medications, adverse events, and relevant laboratory safety parameters**. Incorporation of pharmacovigilance into clinical research will be essential for establishing a reliable benefit–risk profile for *Ayurvedic* interventions in paediatric *Karshya*. [19,22]

8. Research Gaps and Future Perspectives

Despite encouraging preliminary findings, the evidence base for *Ayurvedic* interventions in paediatric *Karshya* remains insufficiently standardized. Major gaps include small sample sizes, short treatment durations, heterogeneous diagnostic criteria, variable formulations, inconsistent comparator groups, and limited long-term follow-up. [8,10,11,16-18]

Future clinical studies should use internationally accepted anthropometric indicators such as weight-for-age, height-for-age, weight-for-height, BMI-for-age, and MUAC, interpreted using age- and sex-specific growth standards.[23] Such standardization would improve comparability between studies and strengthen the clinical interpretation of treatment-related changes.

Greater emphasis is also required on **standardization of herbal formulations**, including botanical authentication, processing methods, dose, phytochemical characterization, and quality control. Randomized trials of herbal interventions should follow established reporting recommendations so that the composition and reproducibility of the intervention are adequately documented.[24]

Future trials should additionally incorporate objective outcomes beyond simple weight gain, including dietary intake, growth velocity, body composition where feasible, biochemical nutritional markers, functional outcomes, morbidity patterns, and systematic adverse-event monitoring. Paediatric randomized trials should follow contemporary reporting standards designed specifically for children and adolescents.[25]

Mechanistic research represents another important area. Studies evaluating the influence of selected *Brimhana*, *Balya*, and *Rasayana* interventions on appetite regulation, gastrointestinal function, nutrient absorption, inflammatory pathways, oxidative stress, gut microbiota, and metabolic biomarkers may help clarify the biological basis of observed clinical effects. Such investigations should complement, rather than replace, well-designed clinical efficacy studies.

Overall, future research should shift from predominantly descriptive studies toward **standardized, adequately powered, mechanistically informed randomized controlled trials** capable of generating reproducible evidence for the role of *Ayurvedic* nutritional and phytotherapeutic interventions in paediatric *Karshya*.

9. Conclusion

Karshya in children represents a clinically relevant state of inadequate nourishment that requires attention to both nutritional intake and the factors influencing digestion, assimilation, and tissue nourishment. *Ayurvedic* management provides a multidimensional approach through *Nidana Parivarjana*, *Deepana-Pachana*, *Brimhana*, *Balya*, and *Rasayana* measures, supported by nutrient-dense dietary and phytotherapeutic interventions.

Available clinical studies indicate encouraging improvements in appetite, body weight, MUAC, and other anthropometric parameters with selected *Ayurvedic* formulations. However, the present evidence remains limited by small sample sizes, heterogeneous interventions, variable diagnostic criteria, short follow-up periods, and lack of standardized outcome assessment.

Rather than considering *Karshya* synonymous with a single contemporary nutritional disorder, future research should evaluate *Ayurvedic* interventions against clearly defined paediatric nutritional phenotypes

using standardized growth indicators. Integration of classical therapeutic principles with rigorous clinical methodology, formulation standardization, mechanistic evaluation, and systematic safety monitoring may help establish the evidence-based role of *Ayurvedic* nutritional and phytotherapeutic interventions in paediatric nutritional care.

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