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NUTRITIONAL DISORDERS IN CHILDREN: AYURVEDIC PEDIATRIC MALNUTRITION MODEL (APeMM) – A CONCEPTUAL REVIEW

Vimal Kishore Yadav [* 1] and Shrikant Verma [2]

MD Roga Nidana Evum Vikriti Vigyan, NCISM Curriculum, Ayurvedic Medical Officer, AYUSH Department, Government of Madhya Pradesh, India.
MD Samhita Evum Siddhant, NCISM Curriculum, Ayurvedic Medical Officer, AYUSH Department, Government of Madhya Pradesh, India.

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Correspondence to Author:
Dr. Vimal Kishore Yadav

Ayurved Medical officer,
AYUSH Department, Government of Madhya Pradesh, India.

E-mail: yadav.vimal.9891@gmail.com

ABSTRACT: Childhood malnutrition remains a significant public health challenge in India, where prevalence figures range from 17–35% depending on nutritional indicator (NFHS-5, 2019-2021). Ayurveda conceptualizes nutritional disorders through *Apatarpana* (undernutrition) and *Santarpana* (overnutrition) frameworks, centered on *Agni* (digestive function), *Ojas* (vital reserves), and *Dhatu* (tissue) physiology. This narrative review proposes the Ayurvedic Pediatric Malnutrition Model (APeMM) a 2-axis theoretical framework mapping classical Ayurvedic entities (*Karshya*, *Balshosha*, *Phakka*, *Parigarbhika*) to modern protein-energy malnutrition grades. All models presented are conceptual and unvalidated. Conceptual contributions include: (1) PANAS-5—a proposed prakriti-based algorithm for nutritional intervention; (2) BAALA-Screen a proposed 10-item screening checklist; (3) AyurPOSHAN Kit a proposed implementation framework. Advanced concepts include mechanistic alignments with dysbiosis, maternal-infant dyad strategies, and regional dietary adaptations. This review bridges Ayurvedic and contemporary nutrition frameworks theoretically, without empirical validation, and emphasizes the need for rigorous research before clinical application.

INTRODUCTION: Childhood undernutrition affects approximately 149 million children globally, with 35.5% of Indian children under five displaying stunting and 20.8% showing wasting (WHO, 2021; NFHS-5, 2019-2021) [1, 2, 3]. Beyond biomedical interventions, Ayurveda offers a parallel diagnostic framework emphasizing constitutional variation and preventive principles [4, 5].

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This review synthesizes classical Ayurvedic concepts with contemporary nutrition science to propose theoretical models for further investigation. Ayurveda conceptualizes nutritional disorders within a dyadic classification: *Apatarpanajanya Vyadhis* (undernutrition-related disease) and *Santarpanajanya Vyadhis* (overnutrition-related disease), both reflecting *Dosha* imbalance and *Agni* (metabolic) dysfunction [4, 6].

Central to Ayurvedic understanding are three physiological pillars: *Agni* (digestive and metabolic fire), *Dhatu* (tissue formation), and *Ojas* (vital reserve). This framework proposes a pathway from impaired digestion to tissue depletion to immune compromise [7].

This paper proposes three conceptual contributions intended for future validation: (1) APeMM—a 2D framework linking Ayurvedic entities to modern PEM grades; (2) PANAS-5—a proposed prakriti-based decision algorithm; (3) Implementation Ecosystem proposed tools for health worker deployment. All frameworks are theoretical and require rigorous clinical and implementation research before adoption.

MATERIALS AND METHODS: This is a narrative conceptual review (not a systematic review). Classical Ayurvedic texts (*Charaka Samhita*, *Sushruta Samhita*, *Bhava Prakasha*) were reviewed alongside English-language peer-reviewed literature from PubMed, Google Scholar, and Scopus through 2025 using terms: *Ayurveda*, *malnutrition*, *Karshya*, *Balshosha*, *Agni*, *prakriti*, and *pediatric nutrition*. Contemporary scientific findings on dysbiosis, immune function, and growth physiology were synthesized with classical concepts to derive proposed theoretical models.

Important Limitation: This review contains no primary clinical data, outcome measurements, or validation studies. All presented frameworks (APeMM, PANAS-5, BAALA-Screen, AyurPOSHAN Kit) are purely conceptual and designed for future empirical investigation.

RESULTS:

Ayurvedic Pediatric Malnutrition Model (APeMM): Proposed Framework: APeMM is proposed as a 2-axis classification integrating: (1) nutritional pathophysiology (*Apatarpana* ↔ *Santarpana*) mapped to modern PEM; (2) *Dosha* predominance reflecting constitutional patterns. This mapping is theoretical and has not been clinically validated.

The framework proposes that classical Ayurvedic entities may align with modern categories, though direct diagnostic equivalence is not implied. The proposed central mechanism is: Weak *Agni* → *Ama (byproduct) accumulation* → *Srotas (channel) blockage* → *Dhatu depletion* → *Ojas depletion.* Modern parallels (enzymatic dysfunction, dysbiosis, endotoxemia, immune compromise) are speculative.

Proposed APeMM 2-Axis Classification:

TABLE 1: PROPOSED THEORETICAL ALIGNMENT OF AYURVEDIC ENTITIES WITH MODERN PEM GRADES (UNVALIDATED)

PEM Grade	Vata-Apatarpana	Pitta-Apatarpana	Kapha-Santarpana
Marasmus (<-3z)	Severe *Karshya*	—	—
Kwashiorkor/Edema	*Phakka*	*Parigarbhika*	*Atisthaulya*
FTT (-2z to -1z)	Mild *Karshya*	Balamutra *vikara*	Medoroga
Normal/At-risk	—	—	*Sthaulya* risk

PANAS-5: Proposed Prakriti-Based Algorithm (Unvalidated): PANAS-5 proposes that constitutional assessment may guide dietary intervention, though this approach has no published validation. The 5-question prakriti assessment tool evaluates: sleep pattern, stool consistency, skin texture, appetite tendency, and activity level.

Proposed Age-Matched Dietary Components (Unvalidated Theoretical Examples Only—not Clinical Recommendations):

TABLE 2: PROPOSED PANAS-5 DIETARY FRAMEWORK (CONCEPTUAL ONLY—REQUIRES CLINICAL VALIDATION BEFORE USE)

Age	Vata (proposed)	Pitta (proposed)	Kapha (proposed)
6–12m	Rice + milk	Brahmi *ghrita* 2g	Avoid sweet milk
1–3y	Warm oil massage	*Ashwagandha* 3g	No curds
3–5y	*Shashtika* rice 30g	*Chyawanprash* 5g	Millet *khichdi*
>5y	Family meals + ghee	Continue herbs	Light foods

Ayurvedic Entities: Classical Descriptions and Proposed Modern Correlations: Four classical entities are reviewed with proposed (not established) modern correlations:

Karshya (Emaciation): Proposed as chronic *Vata*-driven wasting with weak *Agni*. Proposed management includes *Agni Deepana* (warm spices), nourishing foods (*ghee, milk, rice*), and *Abhyanga* (oil massage). This represents Ayurvedic conceptual theory, not evidence-based protocol.

Balshosha (Wasting with Infection): Proposed as *Vata-Pitta*-driven wasting with infection. Proposed staged management (initial gentle digestion support, then nourishment) with infection support herbs (*Tulsi*, *Turmeric*). Conceptual proposal only; requires validation.

Phakka (Kwashiorkor-like Syndrome): Proposed as severe *Vata-Kapha* imbalance with marked edema and wasting. Proposed management emphasizes cautious, gradual intervention. This represents Ayurvedic theory without clinical evidence; acute medical management must remain primary.

Parigarbhika (Intrauterine/Early Infancy FTT): Proposed as failure to thrive from inadequate maternal nutrition. Proposed maternal supplementation during pregnancy and lactation, though efficacy is unproven. This framework suggests integrating maternal nutrition support, pending validation.

BAALA-Screen: Proposed Screening Framework (Unvalidated): BAALA-Screen proposes rapid identification of at-risk children through 10 Ayurvedic and nutritional indicators. Scoring thresholds and referral cut-offs are theoretical proposals without validation:

TABLE 3: BAALA-SCREEN—PROPOSED SCREENING FRAMEWORK (THRESHOLDS UNVALIDATED; CLINICAL VALIDATION PENDING)

#	Indicator	Score	Modern Correlate
1	Poor appetite	2	Weak digestion
2	Lethargy	2	Low energy
3	Visible wasting	3	MUAC <11.5cm
4	Edema	3	Protein deficiency
5	Recurrent infection	2	Low immunity
6	Diarrhea	2	Malabsorption
7	Hair changes	2	Protein deficit
8	Stunting	2	Growth delay
9	Developmental delay	2	Neurological impact
10	Skin rashes	1	Dermatitis

Proposed referral thresholds (NOT VALIDATED): Score ≥8 suggests high risk; 5–7 suggests moderate risk; <5 suggests low risk.

AyurPOSHAN Kit: Proposed Implementation Framework (Theoretical): The AyurPOSHAN Kit proposes delivering Ayurvedic nutrition support through existing Anganwadi centers. Cost projections and feasibility claims are theoretical and have not been evaluated economically. Proposed cost (₹15/child/day) includes herbal formulations (₹6), liquid preparations (₹2), oil therapy (₹4), and administrative costs (₹3). These estimates are hypothetical and require validation. Proposed weekly schedule (15 minutes): *Abhyanga* (oil massage), simple movement practice, parental counseling. This framework is conceptual and requires feasibility and implementation science investigation.

Advanced Conceptual Frameworks:

Microbiome-Agni Alignment: This section proposes theoretical parallels between dysbiosis patterns in malnourished children and Ayurvedic concepts of impaired *Agni* and *Ama* accumulation. These alignments are speculative, not mechanistically validated. Future research should investigate whether Ayurvedic interventions modify microbiota composition.

Maternal-Infant Dyad Prevention: The framework proposes maternal supplementation during pregnancy and lactation to prevent childhood undernutrition. Efficacy is unproven. *Shatavari* and *Ashwagandha* are proposed based on classical texts, but clinical evidence is absent.

Regional and Seasonal Adaptation: Ayurveda emphasizes *Ritu* (seasonal) and *Desha* (geographic) dietary adjustments. This review proposes seasonal variation in *Agni*-supporting interventions (e.g., increased ghee in cold season). This framework

represents Ayurvedic dietary principles without empirical validation.

Integration with POSHAN Abhiyaan: Policy Considerations: This review proposes potential alignment between Ayurvedic principles and India's POSHAN Abhiyaan (Pradhan Mantri Poshan Shakti Nirman) program, emphasizing nutrient density and warm meal delivery. Such integration requires policy discussion, pilot testing, and rigorous evaluation not implementation based on this review alone.

DISCUSSION:

Conceptual Strengths and Acknowledged Limitations: APeMM proposes a 2D framework potentially enabling communication between Ayurvedic and biomedical practitioners. PANAS-5 suggests that constitutional assessment may guide personalized intervention.

BAALA-Screen proposes a practical screening approach. None of these frameworks have empirical support, and all require rigorous validation before clinical or programmatic use.

Critical limitations: (1) No clinical outcome data; (2) Herbal dosages are unvalidated; (3) Screening thresholds lack calibration; (4) Cost estimates are projections, not economic evaluations; (5) Safety data for proposed pediatric formulations is absent; (6) Scaling assumptions are untested.

Mechanistic Speculation: The proposed alignment between *Agni* dysfunction and dysbiosis, *Ama* accumulation and endotoxemia, *Ojas* depletion and immune compromise are theoretical interpretations, not validated mechanisms.

Future research should rigorously test these proposed relationships using metagenomic, immunological, and nutritional biomarkers.

Path Forward: Research Priorities: Before any clinical deployment, this framework requires:

1. **Rigorous RCTs** testing PANAS-5 protocols against standard biomedical care with objective outcomes
2. **Pharmaceutical standardization** of pediatric Ayurvedic formulations with safety and potency validation
3. **Mechanistic research** on proposed *Agni-Ojas-Ama* relationships
4. **Health systems research** on feasibility, acceptability, and cost-effectiveness
5. **Maternal-infant trials** evaluating proposed supplementation strategies
6. **Long-term follow-up** assessing developmental and cognitive outcomes

CONCLUSION: This review proposes conceptual frameworks for integrating Ayurvedic and contemporary nutrition approaches in resource-limited settings. APeMM, PANAS-5, BAALA-Screen, and AyurPOSHAN Kit represent theoretical contributions intended to stimulate research discussion, not clinical implementation. The frameworks are deliberately unvalidated and emphasize the need for rigorous empirical investigation before adoption. Future research should test whether Ayurvedic constitutional assessment, herbal interventions, and preventive maternal-child strategies offer meaningful advantages in addressing childhood malnutrition when integrated with biomedical approaches. This work represents a conceptual synthesis requiring substantial experimental and implementation research to establish evidence-based integration pathways.

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- Dr. Vimal Kishore Yadav: Conceptual framework design, literature synthesis, manuscript preparation
- Dr. Shrikant Verma: Classical Ayurvedic interpretation, critical review

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