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Management of Moderate Acute Malnutrition through Amylase-Rich Foods Powder along with *Ashwagandha Rasayana*: A Case Study

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Abstract

Background:

Moderate acute malnutrition (MAM) is a critical global health issue, particularly affecting children under five. India's prevalence of underweight children is among the highest globally, nearly twice that of Sub-Saharan Africa. Malnutrition involves deficiencies *or* imbalances in energy and nutrient intake[1]. The modern approach for MAM includes providing adequate calories (150 kcal/kg/day) and proteins (3g/kg/day)[2]. However, reduced appetite in children often poses challenges for this treatment. *Ayurveda* identifies diseases like *Balashosha, Karshya, Phakka*, and *Parigarbhika* correlating with malnutrition, rooted in digestive fire disturbances (*Agni Vaisamya*). Correcting digestion is essential for proper absorption of nutrients.

The treatment modality is based on altering the *Visam Agni* with *Deepan-Pachana Bhrimana* by introducing an appetite stimulant. The case was managed with the help of Amylase-rich food powder as an

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appetite stimulator, and *Ashwagandha Rasayan* provided *Bhrimhana*.

Objective

The purpose of this study was to evaluate the efficacy of Cereal based Amylase food powder along with Ayurveda treatment.

Method

Following Ayurveda basic principles as root basis, A two years old female child with Moderate acute malnutrition (*Balsosha*). Based on the history provided by patients mother and after examining the patient treatment plan was made. The protocol included *Amapāchan* by *Chitrakadi Vati* and *Agniwardhana* with integration of Cereal based Amylase rich food powder and *Brihmana* by *Ashwagandha Rasayana* for *Brihmana* was introduced to the patient and dietary modifications as per requirement.

Result

The integrative treatment approach proved successful in achieving liking for food, improved appetite, digestion and weight gain. There was subjective as well as objective improvement in patient conditions.

Keywords: *Balashosha*, *Karshya*, *Phakka, Parigarbhika,* Amylase-rich food, Case report

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Introduction

The vast majority of infants (after six months of age and onwards) develop malnutrition because of weaning with bulky, viscous, yet nutritious porridges/gruels of cereals consumed in developing countries like India. In developing countries, the children who live in poverty and an environment of starvation and multi-deprivation have physical and developmental deprivation. Malnutrition connotes both undernutrition as well as overnutrition[3]. The terms undernutrition and protein-energy malnutrition are used interchangeably. Undernutrition children have a higher risk of infections and mortality.

Undernutrition has three sub-groups: Underweight, Wasting and stunting. An underweight child has low weight-for-age. It means that the weight of this child is less than minus two standard deviation scores(-2SD) on the WHO growth standard.

The infants cannot consume the gruels in adequate amounts per feeding and hence get low calories, which leads to malnutrition. So, providing a method for preparing Amylase-rich food powder as a supplement to the malnourished children[3]. To see the synergistic effect of amylase-rich food powder when combined with Ashwagandha Rasayan[4].

Balashosha consists of two terms, *'Bala'* and *'Shosha',* which refer to the emaciation of a child. *Bala Shosha* is attributed to the deficiency of all seven *Dhatus.* Clinical symptoms include *Aruchi, Pratishyaya,* and *Shukla Netra.*

Balashosha is a condition resulting from improper nutrition. This disease is only described by *Acharya Vagbhatta* in his texts *Astangasangraha*[5] and *Astangahridaya*[6] Other scholars, such as *Charak*[7] and *Sushruta*, discussed similar conditions using terms like '*Shosha*' and '*Krusha*'. *Sharangadhara* referred to it as '*Gatrashosha*' and '*Dourbalya*', while *Yogaratnakara* called it '*Karshyaroga*'. The causes and symptoms of *Parigarbhika*, *Shuskarevati*, *Ksheeralasaka*, and *Phakka Roga* are also comparable to those of *Balashosha*. It specifically affects children.

Objective

The purpose of this study was to evaluate the efficacy of Cereal based Amylase rich food powder along with Ayurveda treatment, as an integrative approach in *Balashosha.*

Brief history of the patient

A 2-year-old female patient from Jaipur presented with a complaint of not gaining

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weight for the past six months, along with frequent falls while walking, abnormal gait, and difficulty holding objects. The child disliked all food and generalized weakness, with no diurnal variations or specific aggravating factors. The mother noted that the child had been asymptomatic until six months of age, after which top feeding was introduced intermittently, leading to a failure to gain weight. The child achieved all developmental milestones, but the symptoms worsened over the last four months, prompting the visit to NIA *Balroga* OPD for further treatment.

ETIOLOGY

According to *Acharyas*

- Excessive sleeping during day.
- Drinking ice-cold water.
- Drinking breast milk vitiated by *Shleshma (Kapha)*

Classification[8]

Malnutrition is a widespread condition classified by severity, progression, and the impact of energy or protein deficiency on clinical and biochemical parameters.

Table No. 1: WHO Classification

Nutritional Status	Body weight as % standard for age	Edema	Deficit in weight for height
Under weight	80-60	0	Minimal
Nutritional dwarfism	<60	0	Minimal
Marasmus	<60	0	++
Kwashiorkar	80-60	+/++	+/++
Marasmic Kwashiorkar	<60	+	++

Table no. 2: IAP classification

Nutritional Grade	% of standard weight for age
Normal	>80%

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Grade 1	71-80%
Grade 2	61-70%
Grade 3	51-60%
Grade 4	<50%

Table no. 3: Classification based on NCHS standard

Indices	Nomenclature for deficit of india	Cut off defining % of reference median	Points for malnutrition on Z or SD score from reference median
Weight for age	Underweight	<80	<-2
Height for age	Stunting	<90	<-2
Weight for height	Wasting	<80	<-2

Table no. 4: Gomez classification

Weight of the child	Grade
90-110%	Normal
75-90%	1ST degree malnutrition(mild)
60-74%	2nd degree malnutrition(moderate)
Less than 60 % of standard	3rd degree malnutrition(severe)

Nidana (Etiology)

The causes of nutritional deficiency disorders can be broadly categorized as[9]:

1. *Aharaja*

   Ruksha Annapana, Langhana, Alpashana, Pramitasana, Anashana, excessive intake of *Kashaya, Katu* and *Tikta Rasa.*
2. *Viharaja*

   Kriya Atiyoga, Vega Nigraha, Ati Adhyayana, Langhana, Atibharagamana.
3. *Manasika*

   Pramilaka, Atikrodha, Bhaya etc.
4. ***Rupa* (clinical features)**

In *Balashosha* there is *Vridhi* of *Kaphadosha* as well as *Kshaya* of *Rasadhatu* and further *Dhatus.* Thus *Balashosha* exhibits the clinical

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features of *Rasa Kshaya*.

The following Rupas are enumerated in Astanga Hridaya[10]

- *Aruchi*(anorexia)
- *Pratisyaya(coryza)*
- *Jwara*(pyrexia)
- *Kasa*(cough)
- *Shosha*(emaciation)
- *Snigdhamukha*(paleness of face)
- *Snigdhanetra*
- *Suklanetra*

5. *Cikitsā Sutra* (Treatment Principles)

The ancient Indian system of medicine, *Ayurveda*, means "the science of life." It is a way of life that includes healing through harmony with nature and the environment. The principle[11] of treatment involves eliminating the cause of illness and restoring balance to the *Doshas* and *Dushyas*.

To stimulate Agni (*Deepana Pachana*), attempts are made to enhance digestion and metabolism using Deepana and *Pachana* drugs, which increase *Jatharagni* and thereby *Dhatwagni.*

To relieve obstruction of *Srotas, Sodhana Karma* is performed to clear blockages in *Rasavahi Srotas*. Since children are delicate, full *Panchakarma* therapy may not be suitable. Instead, a mild purge using medicated milk is administered.

Use of *Brimhana* Drugs: After correcting *Agni* with *Deepana* and *Pachana* drugs, the child can digest and metabolize food better. Nutrient therapy is then provided for promoting and strengthening the *Dhatus* through restorative drugs or nutrient tonics.

Case Report

A two-year-old female patient from Jaipur visited the pediatric OPD with her mother due to not gaining weight for six months. The condition has progressively worsened, with no diurnal variations or known causes. She also experiences frequent falls, abnormal gait, difficulty holding objects, and generalized weakness. The child was healthy until six months of age, exclusively breastfeeding and achieving weight gain milestones. After introducing top feeding, weight gain ceased, and weakness appeared. Since then, the severity has increased, leading to more frequent falls and wrist/digital changes. The mother brought the child to NIA Balroga OPD for further treatment.

Developmental history

Baby achieved all developmental milestones as per age in all the domains(i.e Gross motor, fine motor, social and speech

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domain).

Immunisation history

Patient was vaccinated as per age as per the NIP vaccination schedule and BCG mark was present.

Past history

The child, at the age of five months, experienced a bout of diarrhea. There is no significant history of previous hospitalization.

Family history

The family history does not reveal any relevant medical conditions.

Birth history

Regarding the birth history, there were no prenatal complications such as oligohydramnios, polyhydramnios, pregnancy-induced hypertension, or diabetes. The child was delivered full-term through a normal delivery with a cephalic presentation and baby cried immediately after birth , and the birth weight was 2.3 kilograms.

Dietary history

The child was exclusively breastfed for the first six months of life. However, during this period, the patient experienced a loss of appetite, which resulted in an insufficient intake of food. Despite this, exclusive breastfeeding continued until the age of eight months. At this point, weaning commenced, and semisolid foods were introduced. Biscuits in milk were given twice a day as part of the child's diet. Subsequently, Daliya was introduced; however, the child showed a preference for biscuits dipped in milk or tea and did not consume other foods.

Personal history

- Appetite was poor
- Diet – Aversion to food
- Bowel habits- constipation
- Bladder habits were regular and clear with no abnormalities.
- Sleep was sound with no abnormalities
- Allergy – None reported
- Addiction – None reported

Baseline findings

The patient's general condition was poor with weight 8.04 kg and height 79.5 cm and 12.96 as body mass index (BMI). During the general examination, the child's overall condition was found to be moderate, with a noticeably reduced appetite. The bowel movements were constipated, while the bladder function was regular and clear. The child's temperature was recorded at 97.9°F, with a heart rate of 78 beats per

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minute and a respiratory rate of 22 breaths per minute.

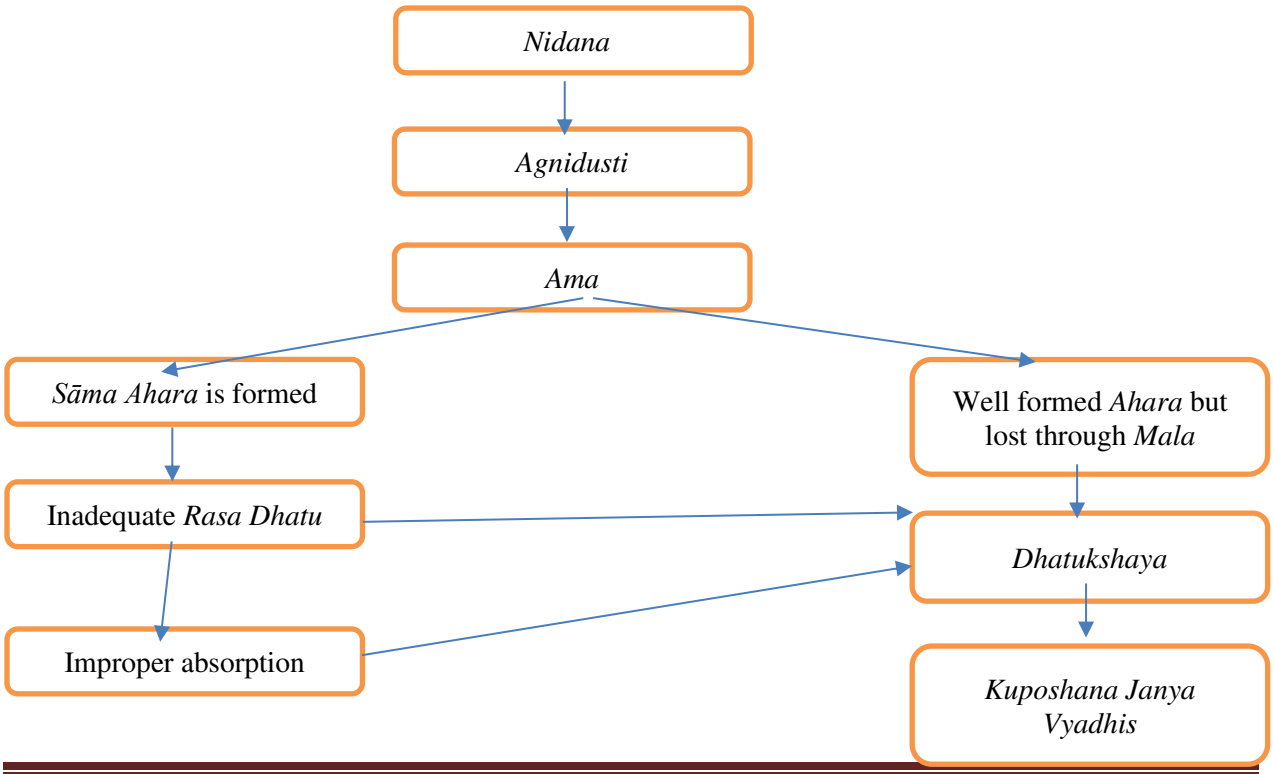
Clinical findings

- Notably, the child exhibited a "monkey face" appearance
- the presence of a flag sign.
- Generalised weakness was present
- Twisting of wrist joints
- Mid Upper arm circumference – 11 cm
- Fatigue was present
- Falling while walking due to weakness
- Z score - -2 as per WHO child growth standards

***Samprapti Ghatakas* [12]**

- *Dosha – Kapha*
- *Dushya – Rasa*
- *Ama*
- *Agni- Agni Vaisamya*
- Srotas – *Rasavāhi Srotas*
- *Srotodusti Prakaras – Saṅga*
- Rogamarga - *Abhyāntara*
- *Vyakta Sthana – Sarva Śarira*
- Roga Swabhava – *Nija*
- Sadhyasadhyata - *Sādya*

Figure No.1: *Samprapti*



Materials and Methods

Assessment criteria –

Patient was observed for improvement in general condition, Appetite and Anthropometric measurements

The currently accepted definitions, set out by the WHO, are as follows[13]:

- ***Moderate acute malnutrition (MAM)***, defined as weight-for-height z-score (WHZ) between −2 and −3 or mid-upper arm circumference (MUAC) between 115 millimeters and <125 millimeters.
- ***Severe acute malnutrition (SAM)***, defined as WHZ < −3 or MUAC < 115 millimetres, or the presence of bilateral pitting edema, or both.
- ***Global acute malnutrition (GAM)*** refers to MAM and SAM together; it is used as a measurement of nutritional status at a population level and as an indicator of the severity of an emergency situation.

Examination:

The child weighs 8.04 kilograms and has a height of 79.5 centimeters. The expected weight for the child's age is 12 kilograms, and the expected height is 89 centimeters. The Mid-Upper Arm Circumference (MUAC) is measured at 13 centimeters. Based on these measurements, the child is diagnosed with Moderate Acute Malnutrition

Investigations:-

The Complete Blood Count (CBC) results show a haemoglobin level of 10.70 g/dl, total red blood cell count of (4.68 \times 10^6/\mu l), white blood cell count of (13.51 \times 10^3/\mu l), and mean corpuscular haemoglobin concentration of 34.00 g/dl1. The serum urea level is 26.40 mg/dl. Routine urine analysis indicates no presence of albumin or sugar, and microscopic examination reveals no pus cells.

Treatment plan given

The patient is treated with

a) *Amapachan – Chitrakadi Vati*
b) *Agnivardhana*- Amylase-rich food powder -cereal based
c) *Ahara*- Dietary modification was done by following 150kcal/kg/day and 3g/kg/day of protein (managed step by step)
d) *Balya*- Ashwagandha *Rasayana*

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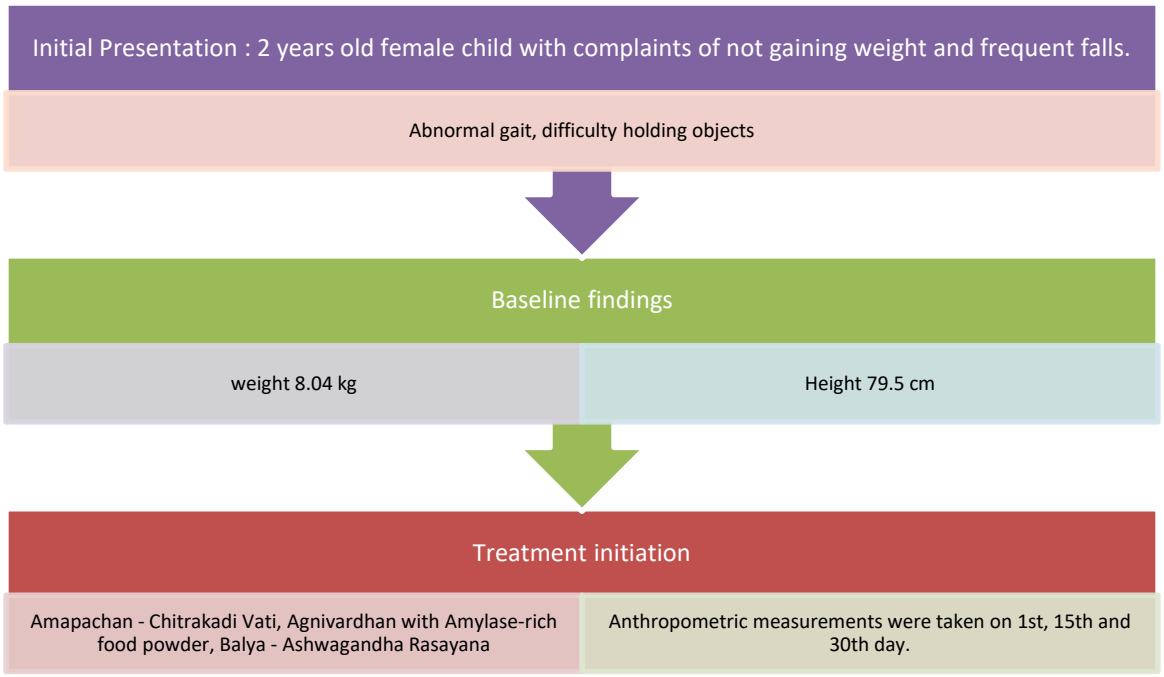
Table No. 5 : Treatment plan

Procedure	Medicine	Dose	Duration	Route
Deepan Pachan	*Chitrakadi Vati*	1tab(125mg) bd with lukewarm water	For 5 days	Oral
Agnivardhana	Amylase-rich food powder- cereal base	1 pinch was added in each porridges served	For 30 days	Oral
Ahara	Planned diet	6 times a day	30 days	Oral
Balya	*Ashwagandha Rasayan*	Half tsf (2.5gm) Bd with milk	30 days	Oral

Timeline of events



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Result Assessment

1. Anthropometry

Table no. 6 : Anthropometric measurements of the patient during the treatment

Criteria	1st Day	15TH Day	30th Day
Height	79.5cm	79.5cm	79.7cm
Weight	8.04Kg	8.08Kg	9.0Kg
HC	48cm	48cm	48.1cm
CC	47cm	47.3cm	47.6cm
MUAC	11cm	11.3cm	11.7cm

Discussion

This case study illustrates the effective management of Moderate Acute Malnutrition (MAM) in a 2-year-old female patient through an integrative approach that combines modern dietary guidelines with traditional Ayurvedic treatments. The introduction of amylase-rich food powder as an appetite stimulant, along with *Ashwagandha Rasayan* for nutritional support, showed significant improvements in the patient's nutritional status over a 30-day treatment period.

The patient demonstrated a significant increase in weight from 8.04 kg to 9.8 kg, along with gradual improvements in other anthropometric measurements. These findings underscore the potential of utilizing amylase-rich foods to improve nutrient absorption and caloric intake in malnourished children, addressing the challenges posed by diminished appetite and digestive issues.

This case highlights the significance of a comprehensive treatment plan that includes dietary modifications and appetite stimulation to improve nutritional recovery in malnourished individuals. Future research could investigate the long-term impacts of these combined strategies on growth and

development in children with moderate acute malnutrition (MAM), potentially leading to more effective interventions for addressing global malnutrition.

Role of Amylase-rich Foods[14]

The incorporation of amylase-rich food powder into the diet serves as a pivotal intervention. Amylase aids in the digestion of carbohydrates, which is particularly beneficial for children consuming starchy porridge-based diets. By improving the digestibility of these foods, amylase-rich supplements can facilitate better nutrient absorption, addressing one of the critical barriers to recovery in malnourished children. Addition of commercial amylase to maize-based weaning food increased the nutritional value of weaning.[1]

Role of *Ashwagandha Rasayan*

Ashwagandha Rasayan plays a significant role in addressing malnutrition, particularly in promoting overall health and vitality. Here are some key points

उपचार (*Upchar*): *Ashwagandha Rasayan* is renowned for its adaptogenic properties, which assist the body in managing stress, a factor that can often exacerbate malnutrition.

पोषण (*Poshan*): This formulation enhances nutrient absorption, ensuring that the body receives essential vitamins and minerals, thereby aiding in the recovery from malnutrition.

ऊजा+ (*Urja*): It boosts energy levels, reducing fatigue and enhancing overall physical strength.

प्रतीक्षा (*Pratiksha*): The formulation strengthens the immune system, increasing the body's resilience against infections that can worsen nutritional deficiencies.

विकास (*Vikas*): In children, it supports proper growth and development, addressing stunted growth associated with malnutrition.

Table no. 7 : Pharmacological properties of Ashwagandha as per Ayurveda[15]

Drug Name	*Rasa*	*Guna*	*Virya*	*Vipaka*	*Doshaghnata*	*Karma*	Therapeutic Uses
Ashwagandha[16] *(Withania Somnifera)*	Tikta, Kashaya	Laghu, Snigdha	Ushna	Madhur	Vata-Kapha Samaka	Deepana (Increase digestive fire, A	HealthPromoter[17], Immune-Stimulatory

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Conclusion:

Children diagnosed with Moderate Acute Malnutrition (MAM) frequently encounter difficulties related to diminished appetite and digestive capacity, impeding their ability to fulfill the caloric and protein requirements essential for recuperation. The World Health Organization prescribes an intake of 150 kcal/kg/day and 3 g/kg/day of protein for the treatment of MAM. Nevertheless, as observed in our patient, attaining these targets can be challenging due to reduced appetite and limited tolerance for consuming substantial volumes of food. This underscores the necessity for innovative dietary interventions that enhance palatability and digestibility, thereby promoting increased food consumption.

As this is a single case report, to apply on a large scale population with same reproducibility, more clinical trials should be done on large population scale.

Declaration of patient consent

Obtained the parents consent form, on which parent has granted permission for the case to be published in the journal along with clinical data. The parent understands that although every effort will be made to keep the child's identity anonymous, confidentiality cannot be ensured, the name and initials of their child will remain private.

The patient's perspective and parent satisfaction

The parent expressed high satisfaction with the treatment outcomes. They observed a positive change in their child's health, including improved appetite and weight gain. Throughout the course of treatment and the follow-up period, the patient showed significant improvement in their overall health and well-being. The patient experienced a noticeable increase in energy levels and a reduction in symptoms such as generalized weakness and difficulty holding objects The integrative approach combining amylase-rich food powder and Ashwagandha Rasayan proved effective in enhancing appetite, digestion, and weight gain.

Throughout the course of treatment and the follow- up period, no adverse drug reaction was observed.

Conflicts of interest

There are no conflicts of interest.

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