Undernutrition Treated with Tribulus Terrestris milk decoction enema: A case Report

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Abstract

Background - Underweight is a term used to describe a body weight that falls below the healthy range for an average adult, adolescent, or child. A BMI of less than 18.5 is considered underweight in adults and the elderly. Undernutrition comprises conditions such as wasting (inadequate weight for height), stunting (insufficient height for age), and underweight (low weight for age). Ayurveda provides a different modality of treatment rather than a conventional treatment for weight gain. It will ensure the results without any harmful side effects. Tribulus Terrestris-treated milk decoction enema was used in the management of undernutrition along with some additional ayurvedic treatment. **Method**- A single case study of 26 26-year-old female patients is presented. She was having BMI of 16.9 kg/m^2. The patient was treated with the main treatment of Tribulus Terrestris-

treated milk decoction enema along with additional ayurvedic treatment for 8 days. After follow up we saw outstanding results in her as her BMI increased. **Result**- After follow-ups, we got good results as her weight and anthropometric measurements increased subsequently increasing her BMI to – 18.5 kg/m^2 .Conclusion- Undernutrition can be treated by adopting Ayurvedic treatment.

Keywords – Undernutrition, Tribulus Terrestris, Milk, Weight gain, *Basti*, *Karshya*

Introduction- Underweight is a term used to describe a body weight that falls below the healthy range for an average adult, adolescent, or child. A BMI of under 18.5 is considered underweight in adults and the elderly. Adults who fall 15% to 20% or more below their typical or optimum body weights are also referred to as underweight. Certain dietitians refer to individuals who lose weight inadvertently as "underweight." [1][2].

Malnutrition encompasses deficiencies, excesses, or imbalances in an individual's intake of energy & essential nutrients. This term includes three primary categories of conditions related to inadequate or improper nutrition. Undernutrition encompasses four main categories: underweight, stunting, wasting, &deficiencies in essential vitamins & minerals. Children, in particular, face increased vulnerability to illness & mortality when experiencing undernourishment [3]. Globally, approximately 390 million adults aged 18 and older were underweight in 2022. An additional 190 million individuals had a BMI for their age that fell more than two standard deviations below the reference median, a condition referred to as thinness.

Table number 1 - Classification of undernutrition by BMI (Weight/height ^{2}) [4]

	BMI (kg/m^2)	Classification
1]	> 20	Adequate nutrition
2]	18.5 - 20	Marginal
3]	< 18.5	Under – Nutrition
4]	17 – 18.4	Mild
5]	16 – 17	Moderate
6]	< 16	Severe

Material & method – A single case study of 26 26-year-old female patients is presented. She was having BMI of 16.9 kg/m^2. The patient was treated with the main treatment of Tribulus Terrestris-treated milk decoction enema along with additional ayurvedic treatment for 8 days. After follow up we saw outstanding results in her as her BMI increased. Result- After follow-ups, we got good results as her weight and anthropometric measurements increased subsequently increasing her BMI to – 18.5 kg/m^2

Patient information- A female, aged 26, Hindu by religion, and in the nursing, profession belonging to a middle-class background came to the Outpatient department. The patient talked about her low weight & unable to gain weight from different modalities of treatment she took in the past 2-3 years. The patient was unable to gain weight after her dietician gave her a diet plan, she also had a complaint of abdominal bloating after eating food. She also had a low appetite and disturbed sleep. She was having disturbed digestion and had complaints of hyperacidity. She tried different modalities of treatment like allopathy, homeopathy, and dietician before coming to our OPD. She also has complaints of generalized weakness after her daily work.

Clinical findings - The patient had having normal pulse rate. She had no complaints of constipation or any hard stool, she had normal micturition 4-5 times a day without any burning sensation while micturition. Her tongue was coated showing improper digestion. She could speak clearly. Her body temperature & vision were normal. She was categorized as moderately malnourished.

Table number -2 - Vital examinations

s.no	Head	Observation
1.	Heart rate	76/min
2.	Respiratory rate	17/Minute
3.	Blood Pressure	130/90 mmHg
4.	Temperature	97.5^o F
5.	Weight	46.1 kg
6.	Height	165 cm
7.	BMI	16.9 kg/m^2

Anthropometric measurements –

- Chest circumference – 78.1 cm
- Abdomen circumference – 67.5 cm
- Hip circumference– 81 cm
- Mid-thigh circumference – 38.2 cm
- Mid arm circumference – 24.4 cm

Diagnosis – Malnutrition

According to the International classification of diseases –

ICD 10 – E 44.1, E 44.2 } Nutritional and Metabolic Disease, reduced muscle mass, low BMI, reduced food intake

Treatment – Following ayurvedic treatment was prescribed

For improving digestion and to increase digestive fire – ***Chitrakadi vati* 250 mg** for 3 days was given twice a day before food.

Table number 3- Contents of *Chitrakadi Vati* [5]

Sr. No.	Content	
1.	Plumbago zeylanica	1 part
2.	Piper Nigrum	1 part
3.	Piper Longum	1 part
4.	Piper Chaba	1 part
5.	Zingiber Officinale	1 part
6.	Ferula Asafoetida	1 part
7.	Apium Leptophyllum	1 part
8.	Hordeum Vulgare	1 part
9.	Punica granatum	1 part
10.	Yava kshara	1 part
11.	Sodium bicarbonate	1 part

12.	Black salt	1 part
13.	Vida salt	1 part
14.	Common salt	1 part
15.	Citrus medica juice	QS
16.	Punica grantum juice	QS

After 3 Days -

Enema treatment (basti) - Tribulus Terrestris treated milk enema was given for 8 days after food and once a day.

Content of enema – Tribulus terrestris powder – 20 gm

Milk – 150 ml

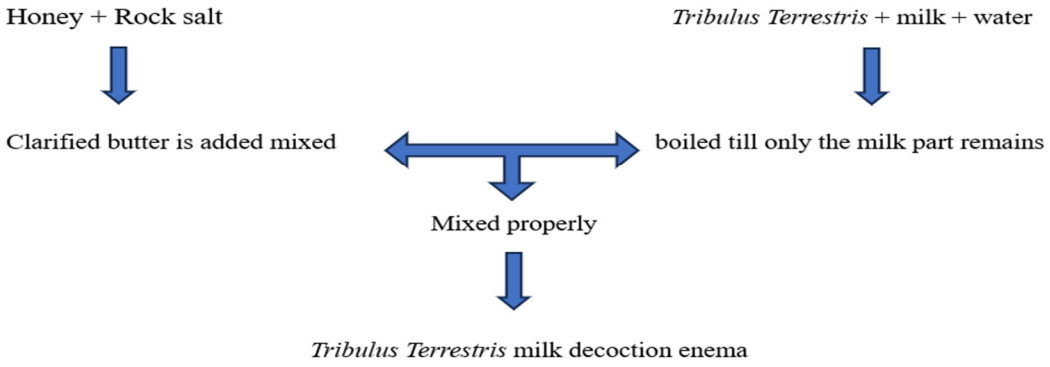
Honey – 17 gm

Clarified butter (ghee) – 25 gm

Water – 600 ml

Milk, water & Tribulus Terrestris powder is boiled and reduced to the quantity of 150 ml, and then other contents are added and mixed properly.

Figure number – 1- representation of making an enema



Pre-Enema Procedure – Before administration of an enema oleation therapy is advised in Ayurveda. It was done with sesame oil for almost 20-30 min until the person was completely oleates. After that Sudation therapy is advised which was done for almost 15-20 minutes. After that Enema was administered [6].

Enema or Basti Technique – The Enema pot is filled with the above content. Apply the oil over the tip of the enema catheter. Air is removed from the pot by letting a small amount of content flow. The catheter should be inserted slowly. While pressing the enema pot it should not be pressed too strong or too soft. All the prepared liquid content should be administered. After that remove the catheter slowly and tell the patient to lie down for a while.

Follow up & outcomes -

Table number – 4 - Assessment Parameters

	Day 0	**Day 15**	**Day 30**
1. Body weight	46.1 kg	47.9 kg	50.3 kg
2. Body mass index	16.9kg/m^2	17.6 kg/m^2	18.5 kg/m^2
3. Anthropometric measurements			
A. Chest circumference	78.1 cm	78.3cm	78.9 cm

B. Mid-thigh circumference	38.2 cm	38.2 cm	38.4 cm
C. Abdomen circumference	67.5 cm	68 cm	68.2 cm
D. Hip circumference	81 cm	81.3 cm	81.4 cm
E. Mid-arm circumference	24.4 cm	24.4 cm	24.5 cm

Effects of Basti or ayurvedic enema are seen over a period that is double the treatment period. So in our case double of 8 days i.e. 16 days [7].

Therapeutic outcome - Observations noted are mentioned in the above tables. after successful treatment, the patient slowly showed improvement in treatment.

Results & Discussion – One should go for this enema (*Basti*) only after completing earlier steps of treatments i.e. *Amapachan* (proper digestion of food) that's why *Chitrakadi vati* was given for increasing digestive power and digestive fire.

Chitrakadi vati is a potent solution to address various health issues not limited to digestive problems such as indigestion, reduced appetite, constipation, anorexia, diarrhoea, as well as sensations of abdominal bloating & heaviness [8].

Table number 5 – effects of content of *chitrakadi vati* [9]

Sr. no	**Contents**	**Effects**
1.	Plumbago zeylanica	Enhance lipid metabolism, alleviates internal Haemorrhoids, relief from dysentery, abdominal issues, peptic ulcers, enhances appetite
2.	Piper longum	Pain relieving properties, prevention of ulcers, bioavailability.
3.	Piper nigrum	Antidiarrheal, antimotility, antisecretory

4.	Piper chaba	Analgesic activity, Anti-diarrhoeal activity, Anti-motility effect
5.	Ferula narthex	Analgesic, Anti-diarrheal & Spasmolytic effects
6.	Punica Grantum	Improves gut microflora, anti-inflammatory, Antidiarrheal
7.	Yava Kshar	Abdominal Bloating, abdominal pain, & ascites, Improves digestive power
8.	Sodium bicarbonate	Antacid, Reduce GI symptoms
9.	Black Salt	Laxative and used in Digestive aid
10.	Vida Salt	Systemic Acidifier maintains pH and exerts a mild diuretic effect
11.	Common Salt	Release saliva
12.	Citrus medica	Antiulcer Activity, Digestive, Antiemetic, stomach tonic

Tribulus Terrestris is mentioned in the Ayurvedic text of *"Bhavprakash of Bhavmishra"*. Such Ayurvedic texts are written in the Sanskrit language. In that, it is said to be "*Deepano*" which means one that can increase the digestive fire of a person. It is also mentioned as "*Pushtida*" which translates to the one that gives strength or increases body mass which is also termed "*Burhan*" in Ayurveda [10]. Also in another Ayurvedic text, "Kayadeva *Nighantu*" T. Terrestris is mentioned as "*Deepano & BalaPushtikrut*" which also translates as above[11]. Another Ayurvedic Text "Dhanvantari Nighantu" Mentioned it as "*Bruhaniya*" meaning body mass increaser [12].

A well-functioning liver is essential in addressing malnutrition through diverse mechanisms. Research indicates that T. terrestris extract exhibits cytoprotective properties and aids in restoring liver structure by reducing levels of liver enzymes like ALT, AST, ALP, and lipid peroxidation, while simultaneously increasing antioxidant levels such as glutathione and superoxide dismutase (SOD) within liver tissue. By this T. Terrestris acts as a hepatoprotective drug which indirectly benefits in the condition of undernutrition [13].

Antioxidants help in protection against oxidative stress which can be related to undernutrition. Antioxidants also help in the absorption of certain nutrients such as iron which can be beneficial for those who are undernourished. It also acts as a promotor of tissue repair and growth. Antioxidants help reduce & alleviate symptoms associated with undernutrition. It also helps in preventing micronutrient deficiencies that contribute to malnutrition. Tribulus Terrestris demonstrated significant antioxidant activity in a concentration-dependent manner through scavenging actions against 2,2-di-(4-tert-octylphenol)-1-picrylhydrazyl (DPPH), H2O2, and superoxide, as well as through the FRAP (Ferric reducing antioxidant power) assay. These findings suggest its potential efficacy in addressing undernutrition [14].

According to an Ayurvedic Text "*Charak Samhita*" cow's milk which is used in our decoction enema is having cooling potency, it is said to induce oiliness, is heavy to digest, sweet in taste, is also said to be "*Burhan*" i.e. body mass increaser in Ayurveda [15].

In a study conducted, it was seen that milk decoction exhibits potent antioxidant action in comparison with water decoction. It proved that milk decoction is more beneficial as compared to water decoction of the same drugs [16].

In another study, it was discovered that the intake of milk was correlated with higher weight-for-age and height-for-age z-scores among individuals experiencing undernutrition, thereby contributing to improved growth outcomes as observed in the study [17]. A multicentre study conducted in an Indian city shows 66.6% of south Indian centers & 27.4% of a north Indian center show lactose intolerance [18]. Our milk decoction enema reaches the colon and can be absorbed through the intestinal mucosa. It also helps in the absorption of saponins present in T. Terrestris.

The *Ayurvedic* text of "*Sharagdhar Samhita Madhyam Khanda*" explains the process of making milk decoction. It gives us the proportion of drug used i.e. T. terrestris in our study, milk & water. The drug chosen should be 1 part, 8 parts of Milk & 32 parts of water which is boiled and reduced to the original quantity of milk [19]. In another Ayurvedic Text "*Sushruta Samhita*" the concept of "*Bruhan Basti*" is mentioned which means body mass increasing enema. In that, it is explained that drugs having *Bruhan* Properties i.e. in our case T. Terrestris with milk, clarified butter, and honey are used. Milk enema falls under the category of "*Bruhan basti*" [20]. Another mention of Milk enema comes in "*Chakrapani tika*". it is said that it acts as a body mass increaser enema. It

also nourishes bone tissue. It is said to be used with *Burhan* drugs for better effect i.e. in our case T. terrestris [21].

According to earlier research, Basti is a multidrug formulation that is administered per rectum and reaches the ileocecal junction [22].

The formulation, administration route, and physiochemical characteristics of the medicine all affect absorption. Drugs can travel across cell membranes in the rectum through active transport, enhanced passive diffusion, or pinocytosis. A clinical study on the pharmacokinetics of enema of *Triphala* (Emblica officinalis, Terminalia bellerica, and Terminalia chebula) decoction enema in humans shows significant absorption of gallic acid in the blood which is an active ingredient of *Triphala* as compared to the oral group [23]. By the above clinical study, we can conclude that the bioavailability of drugs is higher in the enema route rather than oral route. We can also conclude that the active ingredients of the Tribulus Terrestris will also show significant absorption with this phenomenon. With the above, we can conclude that our enema will act the same and will be absorbed and spread throughout the body.

Tribulus Terrestris is also a tonic to improve digestive ability and boost strength. Saponins present in Tribulus Terrestris are not absorbed well in the digestive tract because of their big molecule size. However, they can be taken through the intestinal mucosa through passive diffusion, especially when given with a lipid-based carrier [24]. Our enema or *Basti* Contains milk and clarified butter which is a lipid that helps the saponins present in Tribulus Terrestris get absorbed by passive diffusion in the intestine.

According to contemporary terminology, this activity can be described by the drug's active ingredients acting directly on receptors in the enteric nerve system (ENS)-related gastrointestinal tract. The term "second brain" refers to the ENS, a sizable population of neurons that can react autonomously without the help of the central nervous system [25]. The CNS and ENS are quite similar to one another. Additionally, new research indicates that the two systems have an impact on one another [26]. Basti may activate the central nervous system (CNS) and cause the release of necessary hormones or other substances by acting on the ENS receptors. It is acknowledged that the intestinal neural system possesses a special capacity to mediate reflex action without requiring input from the brain or spinal cord [27]. Thus, we can say that our milk decoction enema acts all over the body according to above discussed phenomenon.

Overall Tribulus terrestris also shows many properties and can be used in many diseases. Numerous research works on Tribulus Terrestris have documented the plant's immense medicinal and pharmacological properties, including diuresis, aphrodisiac, immunomodulatory, anti-hypertensive, anti-diabetic, anti-cancer, anti-bacterial, analgesic, and anti-inflammatory properties. Tribulus terrestris or *Gokshura* is said to improve strength and nourish the body. It is an aphrodisiac, it improves digestion, strength, and immunity. It is said to be useful in piles, cardiac disorders, urinary calculi, eye disorders, and urinary tract disorders [28].

Conclusion – With this study, it is found that such Ayurvedic treatment is beneficial in treating patients with malnutrition. As we can see the patient steadily gained weight without getting any side effects. As with this treatment, it also improves her digestion and helps her in gaining weight. The gained weight was stable even after treatment was completed and she didn't lose weight as in other treatment modalities she lost weight after stopping the treatment. It also reveals that the selected management has a potential effect on curing undernutrition with the added advantage of being free from side effects.

Acknowledgments - The authors recognize the invaluable assistance provided by the scholars whose articles are mentioned and referenced in the manuscripts. The authors are also appreciative of the authors, editors, and publishers of all the papers, journals, and books that were used to review and debate the literature for this work.

Competing Interest- No any competing interests.

Funding- No any funding acquired

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