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# A fortified cereal and Ayurveda herb-based diet (Guducyadi *krushara*) for Sickle cell disease (~*Pandu*) - A case report

**Case Report**

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## Abstract

Introduction: Sickle Cell Disease (SCD) is considered as *Beeja-Dustijanya* and *Pitta Dosha pradhan Vyadhi*, which is counter with a drug-diet plan to alleviate the Crisis and symptoms of SCD, as the genetic origin of the disease makes it non-curable. A diet made with herbs having antioxidant, rejuvenating properties is core for the treatment of disease, *and "Guducyadi Krushra"* is one among them. In the present study, a 12-year-old female child (diagnosed case of Sickle Cell Disease) was treated for 30 days with the *Guducyadi Krushara* as add-on dietetic management along with conventional therapy with hydroxyurea and folic acid. Methods: In this study, *Guduci* is taken as the primary Immunomodulator, processed to form Krushra made up of rice and green gram, and prescribed as a diet regimen for patients with Sickle Cell anemia. Results: There is significant relief in the symptoms of crisis, pain, fatigue, and loss of appetite in the patient treated with Guducyadi Krushra as Pathya Aahara. which was not observed with conventional therapy alone. Discussion: The antioxidant, Anti-sickling, and rejuvenating properties of *Guduci* help to alleviate the symptoms of SCD and help to maintain the Quality of life of the patient. It promotes the healthy RBCs and prevents the sickling. Additionally, *Krushara* (Gruel) is easy to digest and has nutritive value and is accepted in different ethnic populations of India and hence easy to administer with good acceptance by children. It helps to maintain adherence and compliance to the therapy, which yields results. Conclusion: The use of Ayurveda herbs with diet as a regime will help to improve the clinical outcome and integration approach to reduce the burden of diseases like childhood SCD.

**Keywords:** Ayurveda diet, *Guducyadi Krushra, Pandu,* Sickle Cell Anaemia, Sickle Cell Disease.

## Introduction

Sickle Cell Anemia/Sickle Cell Disease is an autosomal recessive hereditary disorder of the red blood cells. (1) The condition is caused by mutations in the hemoglobin molecule's amino acids, also known as a "molecular" disease. This is the outcome of valine being changed to glutamate and adenine to base pair 6 of the beta-globin gene on chromosome 11. (2) The molecular stability and solubility of hemoglobin will significantly change as a result of the substitution of amino acids. The gene's non-coding nucleotide sequence also showed some minor alterations. Haplotypes are polymorphic variations. They discovered four haplotypes. Eastern Saudi Arabia and the Indian subcontinent both possess the Indian-Arab haplotype. (3,4,5) The Bantu haplotype is widespread throughout Africa, the Mediterranean region, and North and South America. The most prevalent genotypes under the umbrella of Sickle Cell Disease (SCD) include homozygous sickle cell anemia (SS), heterozygous sickle cell anemia (AS), and sickle thalassemia (S0). (6) Typically, they begin between 5 and 6 months of age. There could be several health issues, including pain episodes, anemia, bacterial infections, hand and foot edema, and strokes. Painful crisis, sequestration crisis, vascular occlusive crisis, and aplastic crisis are the four subtypes of sickle cell crisis. (7,8,9,10).

*Ayurvedic* literature from earlier does not include much information about sickle cell anemia, however, the condition known as *Pandu* shares some of the same clinical traits. All of the Ayurvedic texts have an explanation of *Pandu Roga*. The disease's main symptom, *panduta*, also known as Paleness is *pandu roga*. Paleness, irritability, weakness, malaise, headaches, and other symptoms are the most typical ones. Consuming unhealthy foods (hot, sour, salty, and oily food items) and engaging in unhealthy activities, such as (day sleep, suppression of natural urges, and physical activity when food is digesting) are some causes of the *Pandu Roga*. (11-16)

In homoeopathic medicine, each patient must be treated individually through a thorough case-taking process that includes a full portrait of the patient with the ailment. According to Organon of Medicine 6th edition §78 *Dr. Samuel Hahnemann* says - *"The true chronic diseases are those that arise from a chronic*

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*miasm, which when left to themselves, and unchecked by the employment of those remedies that are specific for them, always go on increasing and growing worse, notwithstanding the best mental and corporeal regimen, and torment the patient to end of his life with ever aggravated sufferings. These, excepting those produced by medical malpractice."* (17)

## Case History

A 12-year-old female was diagnosed with Sickle cell anemia with fresh complaints of recurrent Fever, Severe Pain in the Joints, Limbs, and Abdomen associated with Anorexia, gradual Weight Loss, and Generalized Weakness approached *Kaumarbhritya* OPD at Parul Ayurved Hospital, Vadodara. The father's occupation was a farmer and the mother was a housewife. The socio-economic status is lower middle class.

### History of Present Illness

The patient has severe pain in joints, limbs, and abdomen associated with Anorexia, Weight loss, and generalized weakness. On examination pallor ++ and Icterus + were found.

### History of past illness

Suffered with the same episodes of pain and Vaso occlusive crisis 2 times within 1 year in which hospitalization was required.

### Birth History

No, major complications and medical interventions were found during prenatal, natal, and postnatal periods. Immunization was done as per the National Immunization Schedule.

### Personal History

- *Aharaja*: Mixed diet with moderate appetite
- *Viharaja*: The patient likes to play outdoor and indoor games but due to fatigue she could not play freely. Sleep was disturbed taking 7-8 hours at night and 1-2 hours a day time.

**Table 1: *Asthavidha Pariksha***

| ***Pariksha*** | **Values** |
|---|---|
| *Nadi* (Pulse) | *Pitta pradhan Tridoshaj* |
| *Mala* (Stool) | *Vibandhita* (Once per Day Hard in Consistency with straining) |
| *Mutra* (Urine) | Normal |
| *Jihva* (Tongue) | *Sama* (Coated) |
| *Shabda* (Voice/Speech) | *Spashta* (Clear) |
| *Sparsha* (Touch/Skin) | *Unushnashita* (Normal) with tenderness due to Mild Hepatomegaly |
| *Drika* (Vision/Eyes/ Sclera) | *Panduta* (Pallor +++ & Icterus +) |
| *Akriti* (Appearance) | Lean as she loses her weight gradually and Thin (due to *mandagni* and *Pandu*) |

**Table 2: Dasavidha Pariksha**

| ***Pariksha*** | **Values** | ***Pariksha*** | **Values** |
|---|---|---|---|
| *Prakriti* | *Pittaja-Vata* | *Satmya* | *Madhyam* |
| *Sara* | *Avar* | *Ahar Shakti* | *Avar* |
| *Samhanana* | *Avar* | *Jarana Shakti* | *Avar* |
| *Satva* | *Avar* | *Vyayama Shakti* | *Avar* |
| *Pramana* | *Avar* | *Vaya* | *Bala* |

### General Examination

On the day of the first visit, the anthropometry data revealed the following (Table No. 3)

Table 3:

| Anthropometry | Values |
|---|---|
| Weight | 33 Kg |
| Height | 137 cm |
| HC* | 50 cm |
| CC** | 75 cm |
| MAC*** | 18 cm |
| BMI**** | 17.6 cm |

*HC = Head Circumference; **CC = Chest Circumference; ***MAC = Mid-upper Arm Circumference; ****BMI = Body Mass Index

The patient had a mild general illness Systematic analysis turned out to be insignificant.

**Table 4: Vital Examinations**

| Examination | Values |
|---|---|
| Temperature | Afebrile |
| Pulse Rate | 82 / min |
| Respiratory Rate | 22 / min |

**Table 5: Systemic Examination**

| | |
|---|---|
| Respiratory Examination | Air entry bilaterally equal (AEBL) & clear No Unusual Sound |
| Cardio Vascular Examination | $S_1S_2$ heard, Normal Rhythm, No abnormal sound |
| Central – Nervous System Examination | Conscious, Active, and Well – Oriented |
| Abdominal Examination | Moderately Liver Palpable by 2 fingers; No other abnormalities were found |

**Differential Diagnoses:** Sickle alpha thalassemia, Sickle beta thalassemia, G6PD, Hb AS.

**Before and After treatment hematological investigation results (Table No. 6)**

**Table 6: Haematological investigations**

| Complete Blood | Before Treatment | After Treatment |
|---|---|---|
| Hb | 9.5 g/dl | 9.7 g/dl |
| RBC Count | 3.23 mill/cmm | 3.90 mill/cmm |
| MCV* | 121.98 femtolitre | 120.50 femtolitre |
| MCHC** | 24.1 g/dl | 25.5 g/dl |
| RDW*** | 16% | 16.80% |
| WBC Count | 10500 /cmm | 10000 /cmm |

*MCV = Mean Corpuscular Volume; **MCHC = Mean Corpuscular Haemoglobin Concentration; ***RDW = Red cell Distribution Width

**Table 7: Effect on Haemoglobin Electrophoresis**

| Haemoglobin | Before Treatment | After Treatment |
|---|---|---|
| Hb F | 14.40% | 13.50% |
| Hb S | 28.80% | 21.50% |

**Treatment Protocol**

Only diet-based treatment was given for 30 days discontinuing all ayurvedic drugs to know the efficacy of the given *Krushra* diet treatment. (Table No. 8)

**Table 8**

| No. | Drug | Botanical Name | Ratio |
|---|---|---|---|
| 1 | *Guduci Churna* | *Tinospora Cordifolia (Willd.)* Miers Menispermaceae | 500 mg |
| 2 | *Amalaki Churna* | *Phyllanthus Emblica* L. P. emblica *Phyllanthaceae* | 1 gm |
| 3 | *Haritaki Churna* | *Terminalia Chebula* Retz. *Combretaceae* | 500 mg |
| 4 | *Sunthi Churna* | *Zingiber Officinale* Rosc. *Zingiberaceae* | 165 mg |
| 5 | *Maricha Churna* | *Piper Nigrum* Linn. *Piperaceae* | 165 mg |
| 6 | *Pippali Churna* | *Piper Longum* Linn. *Piperaceae* | 165 mg |
| 7 | Rice | *Oryza Sativa* L. *Gramineae / Poaceae* | 25 gm |
| 8 | Moong Dal | *Vigna Radiata* (L.) Wilczek *Fabaceae* | 25 gm |

**Table 9: Grading**

| Sr. No. | Signs & Symptoms | Grading |
|---|---|---|
| 1 | Pallor | 0 - no pallor |
| | | 1 - pallor of conjunctiva |
| | | 2 - pallor of conjunctiva, nails, tongue |
| | | 3 - pallor of conjunctiva, nails, tongue, skin |
| | | 4 - pallor of conjunctiva, nails, tongue, palms, and soles |
| 2 | Pain in Joints/Limbs | 0 - no pain |
| | | 1 - pain in only one extremity |
| | | 2 - pain in both extremities |
| | | 3 - involvement of almost all joints |
| 3 | Anorexia | 0 - no anorexia |
| | | 1 - taking a normal diet without any interest |
| | | 2 - taking the food without interest and unable to complete it all the time |
| | | 3 - no interest in taking food |
| | | 4 - resisting or crying while feeding |
| 4 | Loss of Appetite | 0 - taking food in good quantity twice/thrice |
| | | 1 - taking food in normal quantity twice a day |
| | | 2 - taking food in moderate quantity twice a day |
| | | 3 - taking food in less quantity once a day |
| | | 4 - not at all taking food |
| 5 | Fatigue | 0 - normal active child |
| | | 1 - playing and activities reduced |
| | | 2 - feeling tiredness while playing |
| | | 3 - easy fatigability while playing |

**Quality of Life Assessment (WHOQOL-BREF Parameters)** (18)

- Domain – 1 Physical Health
- Domain – 2 Psychological Health
- Domain – 3 Social Relationship
- Domain – 4 Environmental Health

**Quality-of-life (QOL) Assessment**

The WHO quality-of-life assessment factors serve as the basis for the quality-of-life assessment criteria. Because of the poor quality of life, improvement is crucial for patients with sickle cell disease and sickle cell anemia. Hence, the evaluation's purpose is to determine how the patient's quality of life is affected by the *Guducyadi Krushra* diet. Before and after therapy, an assessment was conducted to gauge improvement.

**Table 10: Effect of therapy**

| Symptoms | Before | After | Relief |
|---|---|---|---|
| Pallor | 3 | 1 | 75% |
| Icterus | 1 | 0 | 100% |
| Joint Pain | 3 | 2 | 25% |
| Anorexia | 3 | 1 | 75% |
| Generalised | 3 | 1 | 75% |
| Weight | 33 Kg | 35.5 Kg | 2.5 Kg gain |

Gradation was done based on clinical examination at the time of the visit of the patient for follow-up.

**Effect of Quality-of-life (QOL) parameters:**

**Table 11: Before Treatment Scoring**

| Quality-of-life (QOL) Parameters | Before treatment | | |
|---|---|---|---|
| | Raw Score | Transformed Score | |
| | | 4-20 | 0-100 |
| Domain – 1 Physical | 16 | 9 | 31 |
| Domain – 2 Psychological Health | 16 | 11 | 44 |
| Domain – 3 Social Relationship | 7 | 9 | 31 |
| Domain – 4 Environmental Health | 14 | 7 | 19 |

**Table 12: After Treatment Scoring**

| Quality-of-life (QOL) Parameters | After treatment | | |
|---|---|---|---|
| | Raw Score | Transformed Score | |
| | | 4-20 | 0-100 |
| Domain – 1 Physical | 26 | 15 | 69 |
| Domain – 2 Psychological Health | 23 | 15 | 69 |
| Domain – 3 Social Relationship | 7 | 9 | 31 |
| Domain – 4 Environmental Health | 25 | 13 | 56 |

## Discussion

*Guducyadi Krushara* helped in managing the significant symptoms of *Pandu* like fatigue, pallor, icterus, joint pain, anorexia, fever, and periorbital oedema. It includes herbal medications like *Haritaki, Amalaki, Guduci, Sunthi, Maricha and Pippali.*

*Guduci (Tinospora Cordifolia (Willd.) Miers)* is mentioned in various *Ayurvedic* texts as a *medhya rasayana* (learning and memory enhancer) and as effective for treating *bhrama* (Vertigo). (19,20) *Rasayana* (rejuvenator), *Balya* (strengthen), *Agnidipana* (Stimulating Digestion) *Tridoshshamaka* (Balances Three *Dosha*/humor), *Shlesm-Shonit-Prashamana* (Alleviate the Blood disorders), *Vishaghni,* (Antidote for toxic metabolites), *Aayushyaprada* (Life Promoter) and other actions are among those that *Guduci* has. (21-24)

It has recently been proven to have a variety of health benefits, including anti-sickling, antipyretic, immunomodulatory, anti-diabetic, anti-leprotic, anti-inflammatory, antispasmodic, antioxidant, anti-arthritic, anti-allergic, antimalarial, anti-stress, and anti-neoplastic activities. It also has hepatoprotective and protective properties against neurological disorders. (25) Which reduces pain crises and improves Hb F quality. Additionally, because SCD patients are more susceptible to infectious diseases, the immunomodulatory property lowers the infection rate.

*Amalaki* (*Emblica officinalis*) leaves and fruit extracts have potent antipyretic, analgesic, and anti-inflammatory effects. (26) It has been established that tannins, alkaloids, phenolic compounds, amino acids, and carbohydrates have antipyretic properties. (27,28) *Amalaki* helps in the absorption of iron from the stomach and has antioxidant properties. It could also serve as an important dietary source of vitamin C. (29) *Amalaki* is an herb that has a significant *Karma* (action) as *Rasayana (Rejuvenator)*, which means that it corrects the body's production of the food's essence after consumption. (30)

*Haritaki (Terminalia Chebula* Retz.*)* possesses purgative properties. As *Usna Virya* helps to normalise the *Dhatvagni* and thus aids in the reversal of pathogenesis of Sickle Cell Disease *(Pandu Samprapti).* According to recent studies, several health benefits are present, which include Antiviral, Antifungal, Antibacterial, Antioxidant, Hepatoprotective, Cytoprotective, Cardioprotective, Neuroprotective, Antispasmodic, Anti-plasmodial, Anti-allergic, Immunomodulatory, Anti-inflammatory activity and so on. (31) A blend of chebulic acid (CA) and its minor isomer, neochebulic acid with a proportion of 2:1 secluded from ethanolic concentrate of *Terminalia chebula* organic products demonstrated solid hepatoprotective action. (31, 32, 33) The ethanolic concentration of *Terminalia Chebula* natural product has a key cytoprotective effect against UV-induced oxidative damage. These perceptions were assigned to the inhibitory effect of Terminalia concentrate. (31) The active phytoconstituents of *Terminalia Chebula* extract, gallic acid, and chebulagic acid, displayed immunosuppressive effects on cytotoxic T lymphocytes (CTL) and also prevented cytotoxicity. (34) In several in vitro and in vivo studies, an "anti-spasmodic" property is demonstrated by the reduction of irregular circulatory strain as well as intestinal fits. This attests to its traditional effectiveness for treating digestive problems such as the spasmodic effect seen over the intestine i.e., *Antra-sotha* in *Grahani Roga*. (31, 32, 35, 36)

*Sunthi (Zingiber Officinale Rosc.), Maricha (Piper Nigrum Linn.),* and *Pippali (Piper Nigrum Linn.)* enhance the *Agni* (Digestive Fire) of the patients and help to detoxify the body by removing *Ama* (toxins). It promotes digestion and lessens the formation of unhealthy cholesterol in the body which helps to shed weight more quickly and ensures adequate nutrition for all Dhatu, which is good for Dhatuposhana. The extract of Trikatu Churna greatly decreased CCI4-induced liver peroxidation, confirming the extract's preventive effect against experimentally induced liver damage in rats. The tests typically used to diagnose liver disease are Serum Glutamic Oxaloacetic Transaminase (SGOT), Serum Glutamic Pyruvic Transaminase (SGPT), Alkaline Phosphatase (AP), and Hepatic Tuberculosis (TB). Applying Trikatu Churna ethanolic extract considerably lowered the high levels of these parameters. This work has led to the conclusion that Trikatu Churna has hepatoprotective properties. (37)

*Guducyadi Krushra* has properties that help improve children's nutrition and health, activity, and playfulness, which have been found through dietary management. The *Krushra* preparation improves the quality of life of SCD patients, particularly children because it is used as a diet that is easily eatable without hesitation, which is important. After all, children are pickier and generally avoid taking prescribed medications due to their taste.

During this 30-day trial of diet therapy, we found no significant changes in hemoglobin electrophoresis. Still, it improved the quality of life of sickle cell disease children by allowing them to do their daily activities.

## Conclusion

*Bijadusti* is the primary cause of the disease, with the consequences of *Jatharagni* and *Dhatvagni Mandya,* and *Dhatu Kshaya* is associated with *Panduta*, resulting in *Tridosha Prakopa, Aama* generation, i.e., premature RBC destruction, and *Dhatukshaya* complicating the overall outcome. In the present case, a manifestation of Vascular Occlusive Crisis with mild hepatomegaly was present. The patient was treated with only dietetic management for 30 days, which shows significant changes in the patient's routine activities. She did not experience any specific symptoms related to a crisis state during this period. The child's weight has also improved, and she is now able to play with friends and participate in various school activities without feeling tired.

This means that long-term exposure to this type of dietetic management, in connection with periodic evaluation, will produce a definite result comparable to simple oral medications. The study will use a large

sample size to evaluate the role of Ayurvedic dietetic management further.

**Adverse Drug Reaction:**

No specific adverse drug reaction was found as it is assumed that the dietic approach can also help to minimize the ADR of drugs also.

**Key Message**

Children with Sickle Cell Anemia/Sickle Cell Disease have a significant morbidity and mortality rate. The painful catastrophe and chronic nature have an impact on life's quality. Their quality of living can be improved by ayurvedic medicines.

**Conflict of Interest:** NIL

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