

A study of Cutaneous Manifestations in Children with Severe Acute Malnutrition

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Abstract

Background: The objective is to study the cutaneous manifestations in children with severe acute malnutrition. **Material and Methods:** The methodology used was cross sectional hospital-based study in Kodagu Institute of Medical Sciences, Madikeri, India in the Department of Paediatrics. There were 150 children aged 6 months - 5 years with a diagnosis of severe acute malnutrition (SAM) as per the World Health Organization (WHO) criteria. All patients were thoroughly clinically and dermatologically reevaluated after informed consent was obtained to ascertain the presence of blotchy, skin lesions. The data collected were analysed at SPSS version 26 and presented in the form of frequency and percentage. **Results:** A total of 150 children participated in this study, among them, 108 (72%) had 1 or more cutaneous manifestation. The most common finding (occurring in 91 or 61% of children) was lustreless hair followed by the presence of dry skin (63 or 42%), hyperpigmented patches (27 or 18%), pyoderma (22 or 13%), and angular stomatitis (15 or 10%). The remaining children had 4 cases (2.7%) of scabies, or uncommon findings of phrynodema, flaky paint dermatosis or periorificial erosions. **Conclusion:** Children in the severity of SAM have a high prevalence of cutaneous manifestations which are important clinical signs of underlying nutritional deficiency. Appropriate medical treatment, adequate nutrition combined with early diagnosis and recognition of these dermatological signs may help to enhance patient outcomes and limit the complications associated with the disease.

Keywords: Protein-energy malnutrition, children, nutritional dermatoses, cutaneous manifestations, severe acute malnutrition.

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INTRODUCTION

Worldwide, malnutrition is a major contributor to all types of morbidity and mortality in children under five years of age, especially in Low- and Middle-Income Countries. According to the World Health Organization (WHO) the malnutrition is defined as a lack, excess, or imbalance of energy and nutrients in a person's diet. Undernutrition comes in various forms of which severe acute malnutrition (SAM) is the most severe and is defined as severe wasting, a markedly reduced mid-upper arm circumference (MUAC) or nutritional oedema. Untreated SAM has a significantly higher risk for infection, poor physical and cognitive growth and death.^[1,2] Malnutrition is a major public health threat among children in developing world including India. The current malnutrition burden is still high, due to poverty, food insecurity, frequent infections, sometimes unhygienic living conditions, poor maternal education, late introduction of complementary foods and inappropriate infant and young child feeding practices.^[1,3] All these factors in combination make children prone to get infectious diseases and lead them other complications as consequence of an unhealthy nutritional status.

The skin's structure and function require sufficient nutrition. Protein-energy malnutrition and vitamin and trace element deficiencies cause a non-specific alteration of epidermal turnover, keratinization, collagen synthesis, wound healing

and immune responses, leading to characteristic dermatological effects.^[4] As one of the most metabolically active organs of the body, it is early signs of nutritional deficiencies are often seen in the skin and dermatological examination is a crucial part of the clinical evaluation of malnourished children. Severe Acute Malnutrition (SAM) children often have multiple skin manifestations such as xerosis, lustreless and easily plucked hair, hypo/hyperpigmentation, angular stomatitis, flaky paint dermatosis, phrynodema, pyoderma, scabies, and periorificial erosions.^[4-6] Their symptoms are a result of multiple protein, essential fatty acid, vitamin and micronutrient deficiencies and can often be worsened by secondary infections with bacteria, fungi or parasites due to compromised immunity. Past investigations have shown there is a relationship between the severity of the pox lesions and the severity of the nutritional deficiency and that it may be used to estimate prognosis of the

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diseases and the risk of morbidity and mortality.^[4,5]

Dermatological symptoms need to be recognised early, as many of these lesions will respond to nutritional rehabilitation and appropriate treatment. Early recognition allows for early diagnosis of deficiencies as well as minimizes the risk for other complications, secondary infections, and better clinical results.^[4] Thus, diagnostic examination of skin should be routinely done with the evaluation of all the children with SAM. The aim of the present study was to identify the range of cutaneous findings of children aged 6 months to 5 years with severe acute malnutrition presented at a tertiary care hospital. This study's results will help shed light on the skin type and complications in pediatrics cases with SAM disease and highlight the significance of early nutrition intervention and holistic clinical care for these patients.

Aim of the study: To investigate the cutaneous manifestations in SAM children.

Objective: To study the cutaneous manifestations in children with severe acute malnutrition.

MATERIALS AND METHODS

The present study was of cross sectional, hospital-based type and aimed at assessing the cutaneous manifestations in relation to children with severe acute malnutrition (SAM). The study was conducted in Kodagu Institute of Medical Sciences, Madikeri, India. For the present study, both children visiting the Pediatric Out Patient Department (OPD) and admitted to In Patient Department (IPD) were recruited. The study population was children 6 months to 5 years old with severe acute malnutrition (SAM) defined by the World Health Organization (WHO). This sample size was determined by the formula $N = 4pq/l^2$, where the p - reported prevalence of 55% from previous study, and l represents the allowable error of the prevalence (15% of 55%). A sample size was determined as 146, but a total of 150 children participated in the study.

Inclusion Criteria

A total of 6 months to 5 years age group children with any of the WHO criteria for SAM were included in the study:

- Weight-for-height below -3 standard deviations (SD) of the WHO Child Growth Standards.
- < MUAC (Mid-upper arm circumference) <11.5 cm.
- Visible severe wasting.
- Bilateral nutritional edema.

Exclusion Criteria

Patients with primary dermatological problems, including epidermolysis bullosa, ichthyosis and atopic dermatitis, and patients with immunodeficiency disorders, such as human immunodeficiency virus (HIV) infection, were excluded from the study, because the disorders linked to the skin are likely to result in cutaneous infections that are independent of nutritional status.

Data Collection: Parents/legal guardians of the participants gave informed written consent for participation prior to enrolment. A structured proforma was used for compilation of the demographic and clinical data. Children enrolled had a comprehensive skin examination to capture and record skin, hair, nail and oral tissue changes from severe acute malnutrition (SAM).

Statistical Analysis: Appropriate data verification and cleaning methods were used to enter collected data into Microsoft Excel. The data collected were subjected to statistical analysis using Statistical Package for the Social Sciences (SPSS) version 26. Data were presented in frequencies and percentages, and summarized using descriptive statistics.

RESULTS

The overall prevalence of all cutaneous manifestations among this group are shown in Table 1. When measuring skin lesions, 72.0% of the 150 children with the most severe forms of acute malnutrition had at least one of the lesions noted and 28.0% had none. The nature of the findings suggest that the prevalence of dermatological manifestation was very high among the children with S.A.M. and the strong association of nutritional deficiencies and skin manifestation was evident.

Table 1: Prevalence of Cutaneous Manifestations Among Study Participants (N = 150)

Variable	Number (n)	Percentage (%)
Children with cutaneous manifestations	108	72.0
Children without cutaneous manifestations	42	28.0
Total	150	100.0

Table 2: Hair Manifestations in Children with Severe Acute Malnutrition (N = 150)

Hair Manifestation	Number (n)	Percentage (%)
Lusterless hair	91	61.0

Data from the participants with regard to hair manifestations are summarized in table 2. The most frequent skin manifestation in the study was lusterless hair that was observed in 91 children (61.0%) of the total study population.

This finding may indicate that changes in the hair are among the earliest and most common clinical signs of serious acute malnutrition and may be due to protein and micronutrient deficiencies.

Table 3: Skin Manifestations in Children with Severe Acute Malnutrition (N = 150)

Skin Manifestation	Number (n)	Percentage (%)
Dry skin	63	42.0
Hypopigmented patches	51	34.0
Hyperpigmentation	27	18.0
Flaky paint dermatosis	1	0.7

Phrynoderma	2	1.3
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Figure 1: Clinical photograph showing pedal oedema in a child with severe acute malnutrition.



Figure 2: Child with severe acute malnutrition showing generalized wasting.

Distribution of different skin manifestation in children with severe acute malnutrition. The most frequently encountered skin lesions were dry skin with 63 (42.0%) children and hypopigmented patch with 51 (34.0%) children. Twenty-seven (18.0%) children had hyper pigmentation. Other, less common, conditions were found in 2 (1.3%) children with phrynoderma and 1 (0.7%) with flaky paint dermatosis. These results have proven that xerosis and pigmentation were the most common dermatological conditions of malnourished children.



Figure 3: Clinical photograph showing lusterless and sparse hair.



Figure 4: Child demonstrating visible severe wasting associated with severe acute malnutrition.



Figure 5: Child with severe acute malnutrition showing nutritional changes.

Table 4: Infectious Cutaneous Manifestations (N = 150)

Manifestation	Number (n)	Percentage (%)
Pyoderma	22	13.0
Scabies	4	2.7

Table 4 listed the infectious skin lesions seen in the study population. The most common infectious skin problem (pyoderma) was found in 22 (13.0%) children and scabies in 4 (2.7%). Such infections can be linked to severe acute

malnutrition and its related immune disruptions and disrupted skin barrier, leading to a predisposition to having secondary infections.

Table 5: Mucosal Manifestations (N = 150)

Manifestation	Number (n)	Percentage (%)
Angular stomatitis	15	10.0
Periorificial erosions	1	0.7

**Figure 6: Clinical photograph demonstrating cutaneous infection in a child with severe acute malnutrition.**

The mucous lesions observed in severe acute malnutrition children are given in [Table 5]. Five children (3.5%) were diagnosed with angular stomatitis and one (0.7%) child with periorificial erosions. These lesions were also rare, but are significant clinical markers for nutritional deficiencies, especially B-complex vitamin deficiencies, as well as deficiencies in other micronutrients.

**Figure 7: Hyperpigmentation over the gluteal region in a child with severe acute malnutrition.****Figure 8: Hyperpigmented lesions over the dorsum of the hand in a child with severe acute malnutrition.**

DISCUSSION

Severe acute malnutrition (SAM) still constitutes a high public health problem in children under five years in children in developing countries. The current study aimed to determine the spectrum of skin lesions seen in cases of severe acute malnutrition (SAM) in children at a tertiary care hospital. Dermatological involvement was had by 108/150 children and was a common clinical feature of SAM. The same has been found by Heilskov et al. who showed that skin changes are common in children with SAM and can be used to determine the extent of a nutritional deficiency.^[1]

The lusterless hair was considered as the most common cutaneous manifestation in the present study being observed in 61% of study population. Protein-energy deficiency negatively impacts hair follicles functioning, causing lusterless, poorly nourished, dry and easily pulled out hair. Similar results were found by Dhale et al. who noted hair changes as one of the most common signs when asking children with severe acute malnutrition (SAM).^[2] An important clinical sign of chronic nutritional deficiency is hair abnormalities, and it may be a valuable instrument for the early detection of affected children.

The second most common complaint was for dry skin (42% of children) followed by hypopigmented patches (34%) and hyperpigmentation (18%). Deficiency of vitamins and minerals affects the skin barrier function as well as startulating the sebaceous gland and epidermal differentiation, resulting in xerosis and pigmentary changes. This is in accord with the results of Pandit and Udaya who reported that dry skin and pigmentary changes are common dermatological symptoms of malnourished children.^[3] The results emphasize the effect of protein and micronutrient deficiency on skin condition.

Infectious skin diseases were also noted, and represented 13% of children with pyoderma and 2.7% with scabies. Under-nutrition bites: It manifests a decreased innate and adaptive immunity which paves the way for bacterial or parasite skin infestations.

Chronic infections due to nutritional deficits negatively affect the immune response and skin barrier function making children more susceptible to recurrent infections, as emphasized by Lakdawala et al.^[4] Early diagnosis and treatment are important to minimise morbidity and to improve recovery.

The lesions of the mucous membrane occurred less often in the present study. There was no one with periorificial erosion and 10% of children had angular stomatitis. B-complex vitamin, zinc and other micronutrient deficiencies are common causes of these lesions. While they were relatively low in number, these still have a clinical significance as they can be a sign of more severe nutritional deficiencies which should be corrected as soon as possible.^[4]

In the present study, flaky paint dermatosis and phrynodema were seldom encountered, and found in one child each. They are traditionally known as classical manifestations and are usually linked to extreme protein deficiency plus high amounts of vitamin A deficiency, but are now rather rare because they can be diagnosed earlier and nutritional rehabilitation is progressing well. Previous hospital-based studies of children with severe acute malnutrition (SAM) also have reported observations to this extent.^[2,3]

Finally, on a general level the results outlined in the present study agree with the earlier studies which showed findings that included hair changes, xerosis, pigmentary abnormalities and secondary skin infections as some of the common dermatological findings in children with severe acute malnutrition. Careful dermatological examination should be a part of the routine clinical examination of all severely malnourished children; many of these lesions will resolve as part of the nutritional rehabilitation process and it is prudent to treat them as soon as possible with appropriate medical management. Rapid detection of these signs and symptoms may allow for early intervention, further nutritional management and decrease disease burden.

CONCLUSION

Almost three-quarters of the participants, mostly children

with severe acute malnutrition (SAM), presented with at least one dermatological lesion, which included loss of eyebrow, crepe-like skin and leaf-like skin. Loss of eyebrow, crepe-like skin and leaf-like skin were frequent features of children with SAM with close to three quarters of the study children having at least one dermatological lesion. Common clinical features included lustreless hair, dry skin and pigmentation; infectious and mucosal lesions did not occur as frequently. This early recognition of these skin symptoms can help with timely diagnosis of the nutritional deficiency and prompt nutritional rehabilitation and medical management. Conclusion: Routine dermatological examination should therefore be viewed as a key tool to utilise for assessment of children with severe acute malnutrition, to enhance treatment outcomes and minimise morbidity due to diseases.

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. WHO. Malnutrition- the global picture. World health organization. Available at <http://www.who.int/home-page>
2. Lakdawala N, Babalola O, Fedels F, McCusker M, Ricketts J, Whitaker-Worth D et al. the role of nutrition in dermatological diseases: facts and controversies. Clin Dermatol 2013;31: 677-700
3. Shruti Dhale et al. Study of prevalence of various cutaneous manifestations in children suffering from severe acute malnutrition (SAM). J Med Sci Clin Res. 2016 ;4(9);12691-12698
4. Heilskov S, Vestergaard C, Babirekere E, Ritz C, Namusoke H, Rytter M, Deleuran M. characterization and scoring of skin changes in severe acute malnutrition in children in severe acute malnutrition in children between 6 months and 5 years of age. J Eur Acad Dermatol Venereol. 2015 Dec; 29(12): 2463-9
5. Pandit Vishalakshi S, Udaya K. a cross-sectional study of nutritional dermatoses among malnourished children in a tertiary care centre. Ind J Ped Dermatol. 2021: 22(3); 226-230.