



Study of Prevalence of Various Cutaneous Manifestations In children Suffering from Severe Acute Malnutrition (SAM)

Authors

Dr Shruti Dhale¹, Dr Muneshwar Bhongade², Dr Sukena Susnerwala³

¹Associate Professor, ^{2,3}Resident

Dept of Paediatrics, Grant Govt. Medical College and Sir J.J Group of Hospitals Mumbai

Corresponding Author

Dr Muneshwar Bhongade

Resident, Dept of Paediatrics, Grant Govt. Medical College and Sir J.J Group of Hospitals Mumbai

Abstract

Aims and Objectives: To study prevalence of various cutaneous manifestations in children suffering from severe acute malnutrition (SAM) in the age group of 6 months to 5 years over a period of 6 months.

Study Design: It was prospective observational study done over a period of 6 months conducted at a tertiary care hospital. All patients between age group of 6 months to 5 years who were diagnosed with severe acute malnutrition were enrolled in this study.

Materials and Methods: The study was approved by the Institutional ethical committee. The patients attending the Emergency, in-patient and outpatient Departments of Pediatrics Division of our institute were enrolled for the study as per the criteria given. It was a prospective, observational study conducted on children in the age group of 6 months to 5 years having severe acute malnutrition. Clinical history, anthropometry, physical examination were carried out in details in all patients. The cutaneous manifestations present in these patients were studied in detail.

Results: The cutaneous manifestations were common in patients presenting with severe acute malnutrition. The Commonest manifestation was angular stomatitis/chelitis which was found to be present in 55% cases. Other manifestation included pigmentary changes, bacterial infections, flaky paint dermatosis, fungal infections, crazy pavement appearance and flag sign were present in 30%, 25%, 20%, 20%, 17.5% and 15% respectively. The less common features included ichthyosiform skin changes and acrodermatitis which were found in 10% and 5% of patients respectively.

Conclusion: Malnutrition affects almost all organ systems of body and skin is no exception to this. All patients presenting with or being treated for severe acute malnutrition should be thoroughly examined for any cutaneous lesion and if found it should be appropriately treated.

Keywords: Severe acute malnutrition, Cutaneous manifestation, cheilitis, acrodermatitis.

Introduction

The World Health Organization defines malnutrition as "the cellular imbalance between supply of nutrients and energy and the body's demand for them to ensure growth, maintenance, and specific functions."^[1] Severe Acute Malnutri-

tion is defined as weight for height less than -3SD and/or visible severe wasting and/or edema of both feet (excluding other causes of edema), mid arm circumference less than 11.5 cm (in infant more than 6 months of age)^[2]. According to

national family health survey III in India 6.4% of children below 5 years are suffering from severe acute malnutrition. The median case fatality rate is approximately 23.5% . Malnutrition in children is rampant in developing countries and is responsible for more than half of the 10 million deaths annually among children less than 5 years. Over 2/3rd of these deaths which are often associated with inappropriate feeding practices occurred during 1st year of life^[3].

While it can be seen in any age group children are most commonly affected by malnutrition and its complications. Malnutrition in women in child bearing age group adversely affect the infants and there is increase incidence of low birth weight babies in such women^[4]. Malnutrition affects all organ systems of the body. Dietary protein is essential to provide amino acids for synthesis proteins, hormones and other compounds that have various vital roles. Energy is essential for almost all biochemical and physiologic functions in the body. Various micronutrient and macronutrient deficiencies which is usually seen in these patients adversely affect the normal physiological functioning of the body. Malnutrition is also responsible for decreased immunity and its consequences in the form of bacterial, viral and fungal infections. Various studies have shown that malnutrition affects cognitive and intellectual functions of the growing brain. In severe cases there is cerebral atrophy and other structural changes in brain. Various studies have also reported malnutrition to be causative factor in scholastic backwardness in school children^[5]. More recently, neuroimaging studies have found severe alterations in the dendritic spine apparatus of cortical neurons in infants with severe protein-calorie malnutrition. These changes are similar to those described in patients with mental retardation of different causes^[6].

Cutaneous manifestations are one of the most important manifestations of severe acute malnutrition. The etiology of these skin changes is multifactorial. It is very difficult to systematically describe their character purely in dermatological terms. The severity of skin lesions can predict the

morbidity and mortality in patients admitted for malnutrition. Moreover skin lesions sometimes can point towards specific deficiencies like zinc deficiency in acrodermatitis or vitamin A deficiency in pheroderma. The proper clinical examination, systematic investigations and classification of skin lesions will improve the outcome of patients admitted with severe acute malnutrition^[7]

Materials and Methods

All study patients were enrolled at a tertiary care hospital in a metropolitan city of India. This tertiary care centre serves as a major referral centre for Maharashtra. It was a prospective, observational study conducted on children in the age group of 6 months to 5 years having severe acute malnutrition. The approval of ethical committee was obtained prior to conducting the study. All patients between age group of 6months to 5 years admitted in our hospital who met the criteria of SAM (weight for height less than -3SD and/or visible severe wasting and/or edema of both feet (excluding other causes of edema), mid arm circumference less than 11.5 cm)were enrolled in the study after the parents consented for study. Patients who are predisposed for cutaneous infections like those with immunodeficiency syndromes, HIV positive patients and children having primary skin disorders like epidermolysis, ichthyosis vulgaris, atopic dermatitis and eczema were excluded from the study. The demographic data like patient age, gender, address, provisional diagnosis date of admission and final diagnosis were noted. The nutritional history was noted down in detail. Other relevant history like antenatal, natal, postnatal, developmental, and immunisation history was also noted. Additionally, anthropometric measurements, including weight, presence of bilateral oedema, and mid-upper arm circumference, were recorded at the time of admission. Depending on a child's age and ability to stand, measurement of child's length or height was taken. The weighing of baby was done about one hour before or after a feed. A child's length was measured in lying

down (recumbent) position. Height was measured with child standing upright position. Hemoglobin (Hb %) was measured by Coulter method.

Inclusion criteria:

- 1) Age 6 months to 5 years.
- 2) Wt for Ht less than -3SD and/or Visible severe wasting and/or edema of both feet and/or mid arm circumference less than 11.5 cm.

Exclusion criteria:

- 1) Children whose parents refused the consent to be part of the study.
- 2) Children less than 6 months of age
- 3) children more than 5 years of age
- 4) children with immunodeficiency
- 5) Patients having primary cutaneous disorders.

All patients enrolled in this study were examined for the cutaneous manifestations. The size, site and type of cutaneous manifestations were noted. The prevalence of these manifestations were studied in detail.

Results

Forty children aged between 6 months to 5 years meeting the defined criteria for severe acute malnutrition admitted in our hospital were enrolled in this study. Amongst the study group 22 were male and 18 were female.

■ Male ■ FEMALE

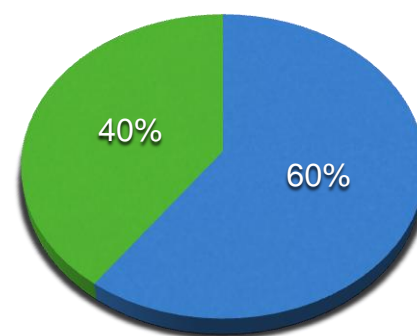


Fig 1: Gender of children having skin lesions in acute severe malnutrition.

Analysis of demographic data revealed that out of 40 children 26 (65%) belonged to age group of 6m-3 years and 14 (35%) belonged to age group between 3-6 years. Family history revealed that 22 (55%) patients came from joint families while 18 (45%) patients belonged to nuclear families. Immunization history of the patients revealed that 28 (70%) patients were immunized up to date while 12 (30%) patients were partially immunized. There was no patient who was totally un-immunized. Socioeconomically 12 (30%) patients came from high/middle class while 28 (70%) patients belonged to low socioeconomic families.

Table 1: Demographic data of cases

Age	Number	Percentage
6 months- 3 years	26	65%
3 years- 6 years	14	35%
Gender		
Male	24	60%
Female	16	40%
Family Type		
Joint Family	22	60%
Nuclear Family	16	40%
Immunisation status		
Up To Date	28	70%
Partially immunised	12	30%
Socioeconomic status		
High/ Middle class	12	30%
Low	28	70%

An analysis of risk factors related to malnutrition revealed that child related risk factors were present in majority of cases. The study of these risk factors revealed that 8 (20%) patients were low birth weight (birth weight less than 2.5 kg). 24 patients (60%) had one or more episodes of illness in last 2 months. The common illnesses were respiratory tract infections, diarrhea, viral

illnesses like measles, chicken pox and mumps. In 10 patients (25%) there was a history of an elder sibling with age difference of less than 2 years. 18 (45%) patients belonged to high birth order. In 16 patients (40%) dietary history could identify faulty dietary techniques like giving diluted milk, bottle feeding and delayed weaning etc.

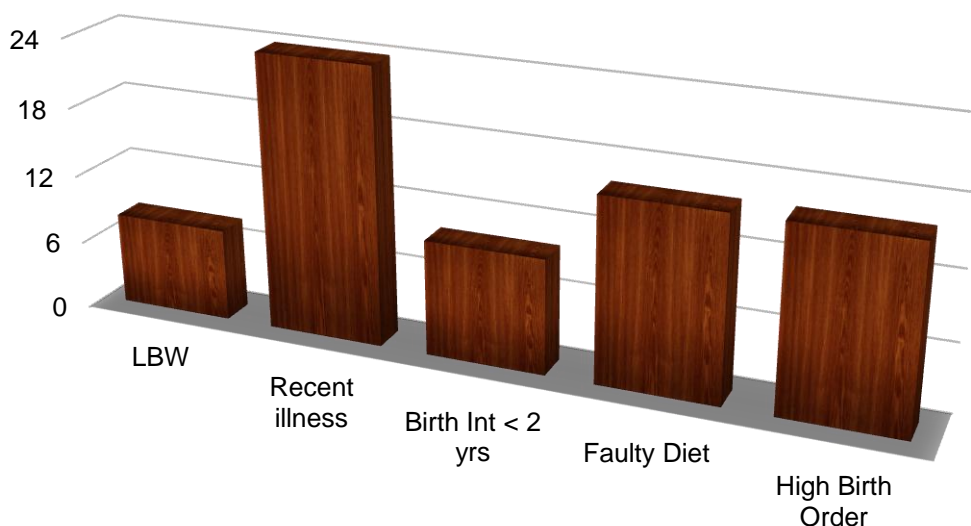


Fig 2: Child related risk factors for severe acute malnutrition.

Maternal and Family Risk Factors

There were many factors which were associated in malnutrition in children 6months to 5 years Socioeconomic-demographic factors like low socioeconomic status, residence in hilly areas etc were present in 10 patients (25%), low maternal

education was seen in 8 patients (20%), poor knowledge of mother regarding proper feeding practice was present in 12 patients (30%) Ignorance about continued feeding during sickness in children was present in mothers of 14 patients (35%).

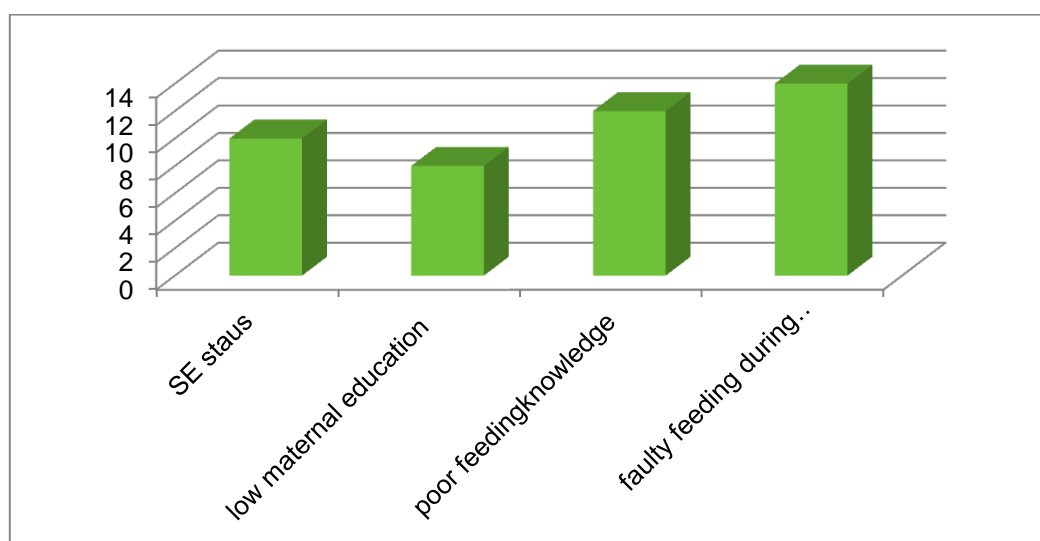


Fig 3: Maternal and family related risk factors for severe acute malnutrition.

The clinical examination showed various vitamin and micronutrient deficiencies in children admitted with severe acute malnutrition. 6 patients (15%) had signs of vitamin A deficiency in the form of xerophthalmia and other ophthalmological manifestations. While 22 patients (55%) showed the signs of Vitamin B complex deficiency like cheilitis and stomatitis. Vitamin C deficiency signs in the form of bleeding gums was present in 2 patients (5%). There are 2 patients (5%) who showed some signs of vitamin D deficiency in the form of rickets. Signs of micronutrient deficiency was present in 12 (30%) patients. Signs of iron deficiency in the form of pallor was present in 30 patients (75%).

Table 2 : Signs of vitamin, micronutrient and iron deficiency in studied cases.

Signs of deficiency	No of cases	Percentage
Vitamin A	6	15%
Vitamin B Complex	22	55%
Vitamin C	2	5%
Vitamin D	2	5%
Micronutrient Deficiency	12	30%
Iron	30	75%

On physical examination various physical signs related to malnutrition were observed. In 16 patients (40%) there was edema and 24 patients (60%) were non-edematous. Pallor was present in

30 patients (75%) and hepatomegaly was present in 28 patients (70%). Thin sparse hairs and perianal rash was present in 8 (20%) and 12 (30%) patients respectively.

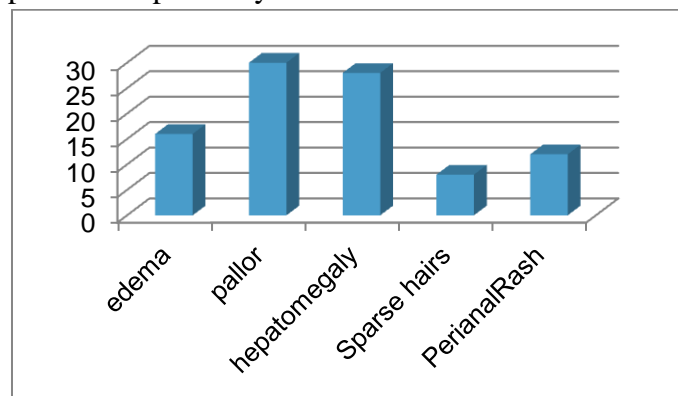


Fig 4: Signs present in children with severe acute malnutrition on physical examination.

All 40 patients of SAM were analysed after thorough clinical examination for cutaneous manifestations and the results are as follows. Angular stomatitis/cheilitis were found to be in 55% patients, pigmentary changes 30% patients, bacterial infections (impetigo, erysipelas, folliculitis) 25% patients, flaky paint dermatosis 20% patients, fungal infections (pityriasis, tinea, candida) 20% patients, crazy pavement appearance 17.5% patients, flag sign 15% patients, ichthyosiform skin changes 10% patients and acrodermatitis was found in 5% of patients.

Table 3 : Cutaneous manifestations in children suffering from severe acute malnutrition

Sr no	Cutaneous manifestation	Male	Female	Total	Percentages
1	Angular stomatitis / Cheilitis	10	12	22	55%
2	Pigmentary Changes (Hypopigmentations & Hyperpigmentations)	05	07	12	30%
3	Bacterial Infections	05	05	10	25%
4	Flaky Paint Dermatitis	03	05	08	20%
5	Fungal	04	04	08	20%
6	Crazy Pavement Appearance	03	04	07	17.5%
7	Flag Sign	03	03	06	15%
8	Ichthyosiform Skin Changes	02	02	04	10%
9	Acrodermatitis	01	01	02	5%



Figure 4: Pityriasis versicolor in a patient with severe acute malnutrition.

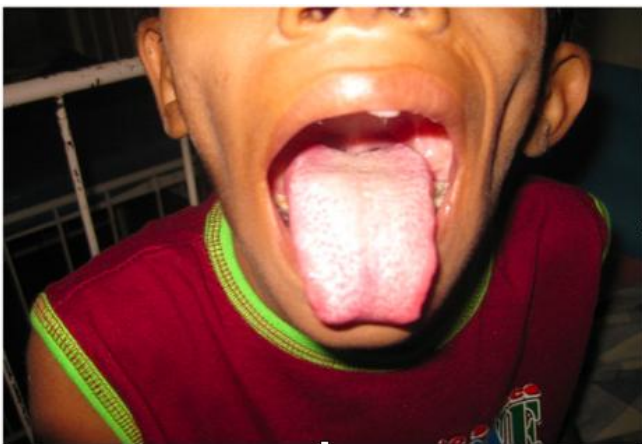


Figure 5: Oral candidiasis seen over the tongue in a patient with acute severe malnutrition.

Skin lesions were more common in areas subject to friction or pressure, for example the groin, knees, buttocks, ankles and at the elbows; in some patients the dermatosis was more extensive involving large parts of the body.

Discussion

Severe Acute Malnutrition is defined as weight for height less than $-3SD$ and/or visible severe wasting and/or edema of both feet (excluding other causes of edema), mid arm circumference less than 11.5 cm (in infant more than 6 months of age). Clinical signs and symptoms of protein-energy malnutrition (PEM) include Poor weight gain, short stature, behavioral problems, Irritability, decreased social interactions and response, attention deficit and hyperactivity. Some studies have even suggested that aggression; hyperactivity and conduct disorder may have its

origin in malnutrition^[8]. Malnutrition is one of the major challenges faced by developing world. Majority of the deaths in under 5 age group in developing countries are directly or indirectly related to the problem of malnutrition. The characteristics and etiological reasons are different for risk of malnutrition in developing and developed world. While Poor environmental conditions, high incidence of infections and infestations, reduced food production, poverty, food taboos and ignorance etc are major contributing factors in developing world^[9], in developed countries malnutrition is usually seen in children who are chronically ill or hospitalized^[10]. There is a vicious circle in between poverty, ignorance and socioeconomic development and malnutrition. While low socioeconomic status, ignorance and poverty are major causes of malnutrition, malnutrition consequently causes increased poverty and further worsening of socioeconomic status of a community. Children suffering from malnutrition are also deficient in various vitamin and micronutrient deficiencies which causes widespread adverse effects and for this reason malnutrition is responsible for many of the indirect causes of under 5 mortality^[11].

Proper nutrition is essential for human bodies to work smoothly. Malnutrition affects adverse almost all organ system of the bodies. Proper nutrition is required for protein and amino acid synthesis. All biochemical, physiological and hormonal functions of the body are dependent upon a steady supply of nutrition through the food. Any imbalance in this may lead to severe dysfunction in the smooth functioning of the various systems of the body. Many of the nutrients acts as co-factors in many vital biochemical reactions are their deficiency will manifest in a widespread form if those micronutrients are deficient for any reason. Furthermore malnutrition affects immunity of an individual. This is more severely manifested in children specially infants as their immune system is still in the stage of maturation. decreased delayed hypersensitivity, reduced T lymphocytes, qualitative defects in T Lymphocyte functions, Impaired phagocytosis,

and decreased surface immunity due to decreases IgA can occur^[12].

The presentation of severe acute malnutrition is weight for height less than -3SD and/or visible severe wasting and/or edema of both feet (excluding other causes of edema), mid arm circumference less than 11.5 cm (in infant more than 6 months of age). In addition to this patient may have widespread manifestations due to vitamin, micronutrient and macronutrient deficiencies. Physical findings of malnutrition include decrease subcutaneous fat in the legs, arms, buttocks, and face. Edema may be periorbital and localized initially but later gross edema leading to anasarca may develop. In addition to this sparse hairs, frontal bossing and other signs of rickets, abdominal distension due to lax abdominal muscle, hepatomegaly, brittle and ridged nails etc may be present^[13]. Many skin lesions are seen in patients of severe acute malnutrition the skin lesions usually first occur in areas subject to friction or pressure, for example the groin, behind the knees, on the buttocks, and at the elbows; in advanced cases, the dermatosis may be almost anywhere on the body--trunk, limbs, or head. The common skin lesions seen in children with malnutrition are Angular stomatitis / Cheilitis, Pigmentary Changes, Bacterial Infections, Flaky Paint Dermatitis, Fungal infections, Crazy Pavement Appearance, Flag Sign, Ichthyosiform Skin Changes and Acrodermatitis^[14]. Proper management of severe acute malnutrition is essential to prevent morbidity and mortality Children with severe acute malnutrition with loss of appetite or any medical complication have complicated severe acute malnutrition and should be admitted for inpatient care. Children who have a good appetite and no medical complications can be managed as outpatients^[15]. In hospital a quick initial assessment should be done for presence of hypoglycemia, infection, hypothermia, fever, dehydration or shock. If any evidence of these abnormalities is found then treatment should be immediately directed towards correction of these abnormalities^[16]. After initial stabilization

nutritional rehabilitation should be started. Patients should be kept in warm and thermo neutral environment. Micronutrient and macronutrient supplements should be given according to standard protocols. Nutritional rehabilitation in the form of ready-to-use therapeutic food (RUTF) and vitamin supplements is important in management^[17]. Management of skin lesions seen in severe acute malnutrition is important. Neglecting skin lesion may cause superadded bacterial infections due to raw surface. Such infections are dangerous in a patient who already is immunocompromised due to malnutrition^[18]. Many of the skin lesions will respond to nutritional rehabilitation and will improve as the child starts tolerating feeds but some of the skin lesions like acrodermatitis may require specific treatment like zinc supplementation^[19]. The identification and management of such skin lesions in severe acute malnutrition is an essential part of management of children with SAM^[20].

Conclusion

Various skin lesions are seen in children with severe acute malnutrition. Proper examination of children to diagnose these skin lesions is essential part of management of SAM. Some of these skin lesions improve once nutritional rehabilitation is started while others need specific treatment.

Conflict of Interest: None

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