NUTRITIONAL STATUS OF INFANTS AND CHILDREN WITH ECZEMATOUS DERMATITIS

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Summary

This study was undertaken in a series of 70 infants (48 males, 22 females) and children aged 1 month to 5 years; with eczematous dermatitis (scabetic 36, pedlculous 7, microbic 9, seborrhoeic 10, atopic 6 and due to irritant applications 2) as the primary disease for which medical advice was sought. Nutritional failure was detected anthropometrically in 58 (83%) of them, including 16 (23%) with acute malnutrition and 42 (60%) with chronic malnutrition. They were variably wasted. A few had stomatoglossitis and 4 had pitting oedema (kwashiorkor). Biochemically, the serum proteins, particularly albumin, was significantly low in eczematous children. Under poor dietary and socio-economic conditions, it is difficult to ascribe the malnutrition to eczematous dermatitis alone but the occurrence of malnutrition in 12 out of 13 from higher economic status with better dietary and environmental background suggests the role of eczematous dermatitis in malnutrition. Associated pyogenic infections seemed to be the most important factor producing malnutrition in this study.

There is indirect evidence to indicate that eczematous dermatitis can cause malnutrition in several possible ways. Those mentioned by various workers are dietary protein restriction[1], allergy to certain protein foods[2], protein loss from skin discharges and exfoliation[3], active protein loss from gut mucosa, malabsorption secondary to allergy[4,5,6] and increased catabolism due to secondary pyogenic skin infections[7]. However, little direct information is available on the nutritional status of children with eczematous dermatitis, and it was, therefore, considered worthwhile to study infants and children with eczematous dermatitis for evidence of malnutrition.

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Materials and Methods

A series of 70 infants and children (48 males and 22 females) with eczematous dermatitis, aged 1 month to 5 years, attending the Dermatology Clinic of the Calcutta School of Tropical Medicine during 1974–75, were investigated with particular reference to dietary intake, environmental conditions, associated infections and clinical anthropometric and biochemical (serum proteins done in 50 cases) evidences of malnutrition. The main basis of nutritional assessment was, however, anthropometric. The children were divided into 3 nutritional groups-eczema

with no malnutrition (ENM), eczema with acute malnutrition (EAM) and eczema with chronic malnutrition (ECM) on the basis of, (i) height for age i.e., height of the child expressed as the percentage of standard height for that age and (ii) weight for height i.e., weight of the child expressed as the percentage of the standard weight expected for the height. The standard for weight and height adopted was the Harvard standard as tabulated by Jelliffe[8]. Low height for age was taken to indicate growth retardation in chronic malnutrition and low weight for height to indicate wasting in acute malnutrition[9]. Acute malnutrition (EAM) was diagnosed when the weight for height was below 90% and height for age was above 95% and chronic malnutrition (ECM) was diagnosed when the weight was below 90% and height for age was below 95%. Malnutritional status was further graded into mild, moderate and severe degrees (specified under observations) in studying the relation of duration of illness with the degree of malnutrition. Children with weight for height above 90% and height for age above 95% were considered under the "no malnutrition" group (ENM) (Fig 1).

Observations

Nutritional groups :

Anthropometrically, there were 12 cases with ENM, 16 with EAM and 42 with ECM.

Age incidence :

In the ENM group, 3 (25%), in the EAM group, 6 (37.5%) and in the ECM group, 32 (76.3%) were above one year of age. Association of chronic malnutrition with eczema was more common after one year of age.

Socio-economic status :

Of the children 57 (81.4%) were from poor or low middle income families and 13 (18.6%) from higher income families. Malnutrition was detected in 46 (80.7%) of the former and in 12 (92.3%) of the latter group (Table 1).

Number of siblings :

Malnutrition was not associated with larger number of siblings. Of those with acute malnutrition only 3 (18.7%) and of those with chronic malnutrition 6 (14.3%) had more than 3 sibs.

Dietetic history :

The dietary history is summarised in Table 2. The duration of breast feeding was long and most of the mothers considered their milk output satisfactory. Children from better economic background had supplements started earlier compared to children of low economic

TABLE 1
Showing the socio-economic status

Economic status	Monthly per capita income Rs.	ENM	EAM	ECM	Eczema total
Very poor	Below 30	–	–	2	2
Poor	30 — 69	3	4	14	21
Low-middle	70 — 149	8	7	19	34
Middle	150 — 299	1	5	5	11
High	Above 300	–	–	2	2
Total		12	16	42	70

ENM — eczema with no malnutrition, EAM — eczema with acute malnutrition and ECM — eczema with chronic malnutrition.

TABLE 2
Showing dietetic history

Group	ENM	EAM	ECM	Eczema total
No. of cases (%)	11 (100)	12 (100)	40 (100)	63 (100)
Breast-feeding (%)				
Upto 3 months	9	17	10	11
3 to 6 months	27	25	22	24
7 to 12 months	27	41	18	24
Above 12 months	37	17	50	41
"Milk adequate"	62	75	75	74
Supplements Started (%)				
By 3 months	73	33	50	51
By 6 months	9	50	30	30
After 6 months	10	17	20	19
Protein restriction (No.)	1	-	3	4
"Food allergy" (No.)	-	-	3*	3

* Banana in 1, Egg in 1, Fish in 1.
ENM — eczema with no malnutrition, EAM — eczema with acute malnutrition and ECM — eczema with chronic malnutrition.

background. Supplements including mixed diet in older children in the former group were also better in quality and quantity compared to that in the latter group, the protein intake from the supplements ranging from 2.5 to 3 g/kg per day and caloric intake ranging from 100 to 150 kcal/kg per day approximately. History of protein (milk, egg, fish, meat) restriction for fear of allergy was obtained in 4 cases (EAM 1, ECM 3).

Diet of the eczematous cases with oedema:

Four children in the ECM group had oedema of legs. The dietary history at the onset of skin lesions in these children showed that cow-milk withdrawal reduced the protein intake in 1 but did not improve the skin lesions. In another, the diet was fairly adequate and in 2 the diet was poor in protein. Hence 3 children had poor protein intake. All the 4 cases, however, had pyogenic lesions due to staphylococci.

Malnutrition in aetiological groups :

Aetiologically, the eczematous dermatitis was found to be scabetic in 36, pediculous in 7, microbic in 9, seborrhoeic in 10, atopic in 6 and primary irritant in 2 (Table 3). Of the 36 with scabetic eczema, 6 suffered from acute malnutrition and 23 from chronic malnutrition. In all the 7 with pediculosis capitis, the scalp was covered with staphylococcal pyoderma and all except one suffered from malnutrition. Again of the 9 children in the microbic eczema group, all except one were malnourished. Secondary infections were common in seborrhoeic cases

TABLE 3
Etiology of eczema in relation to the nutritional status

Eczema clinical types	ENM	EAM	ECM	Eczema total
No. of cases	12	16	42	70
Scabetic	7	6	23	36
Pediculous	1	1	5	7
Microbic	1	4	4	9
Seborrhoeic	2	3	5	10
Atopic	1	2	3	6
Primary irritant	-	-	2	2

ENM—eczema with no malnutrition
EAM—eczema with acute malnutrition
ECM—eczema with chronic malnutrition.

also and 8 of them were malnourished. Contrary to expectation, only one of those with atopic eczema looked well nourished with adequate subcutaneous fat. All others were malnourished. Pyoderma was, however, considerably less in atopic cases.

Other deficiency signs:

Wasting of mild to moderate degree was present both in acute malnutrition and in chronic malnutrition groups. Oedema (as stated earlier) was present in only 4 patients with chronic malnutrition and the picture of kwashiorkor, without however, the typical kwashiorkor-dermatosis. Angular stomatitis and glossitis were observed in 1 child with acute malnutrition and 2 with chronic malnutrition.

Duration of eczematous dermatitis and the degree of malnutrition:

An attempt was made to correlate the duration of the eczematous dermatitis and the degree of malnutrition. Those in the EAM and ECM groups were further subgrouped arbitrarily into grades according to the weight for height data, 90% - 80% as grade I or mild malnutrition 80% - 70% as grade II or modreate malnutrition, and less than 70%, as grade III or severe malnutrition. The observations are presented graphically (Fig. 2). There was poor correlation between the degree of malnutrition and the duration of eczema. A few with severe degree of acute or chornic malnutrition had comparatively short duration of eczema and in these children the lesions were purulent. Apparently, the presence of secondary infections was more important in this regard than the duration of eczema.

Associated diseases

Respiratory symptoms such as cough, nasal discharge and fever at times were recorded in 2 with EAM and 16 with ECM. Two with EAM and 7 with ECM had recurrent diarrhoea.

Anaemia

The mean haemoglobin levels in different groups were as follows: Normal (25 cases) 10.69 $\pm$ 1.22 g%, ENM (10 cases) 10.04 $\pm$ 0.82 g%, EAM (12 cases) 10.78 $\pm$ 1.48 g% and ECM (35 cases) 10.64 $\pm$ 1.38 g%. Statistical comparison showed that eczematous children were not more anaemic than 'normal' children.

Serum proteins

The mean serum protein values in the different groups of children studied are presented in Table 4. The total protein values in ECM but not in ENM or EAM were significantly lower than those in normal children ($P < 0.05$). There was no significant difference between the groups of eczematous children. With regard to serum albumin values, significant ($P < 0.05$) depression was observed in ENM and

TABLE 4

Showing the data on serum proteins in 25 normal and 50 children with malnutrition

Group	No. of cases	Total protein g %			Albumin g%		
		Mean	$\pm$	SD	Mean	$\pm$	SD
Normal	25	6.80		0.73	4.09		0.43
ENM	8	6.49		1.04	3.39		0.93
EAM	10	6.69		0.58	3.60		0.71
ECM	32	6.17		1.13	3.04		0.86

ENM — eczema with no malnutrition, EAM — eczema with acute malnutrition and ECM — eczema with chronic malnutrition.

Statistical comparisons of the data are given in the text under observations.

EAM groups as compared to normal children, and this was highly significant in ECM ($P < 0.01$). Between the eczematous groups, significant ($P > 0.05$) difference existed only between EAM and ECM groups.

Discussion

The present study was undertaken to assess the nutritional status of infants and children with eczematous dermatitis. A series of 70 such cases was studied and they were divided into 3 nutritional groups according to their height for age (deficit indicating chronic malnutrition) and weight for height (deficit indicating acute malnutrition) data. On this basis, only 12 were not malnourished, 16 (23%) suffered from acute malnutrition and 42 (60%) from chronic malnutrition. It may be mentioned here that the majority in the group of chronic malnutrition were anthropometrically similar to pre-kwashiorkor[10,11] only 4 being kwashiorkor.

It is well known that under poor economic conditions, the diet of children after 6 months of age is often inadequate. The nutritional requirements during this period are high due to demands of growth. Hence malnutrition is common in the post-weaning age, particularly in 1 to 2 year age group. The occurrence of more cases of eczematous dermatitis after 1 year of age may, therefore, be of significance as eczema can be an additional factor in producing malnutrition. Some of these eczematous children from lower socio-economic families who had better diet were not malnourished, but significantly, 12 (92.3%) out of 13 from middle or high economic status were malnourished despite better nutritional and living conditions with the advantage of limited number of children in the family. This suggests that eczema could be a factor contributing towards malnutrition. One child in the EAM and 3 in the ECM group subjected to dietary protein (milk, egg, fish, meat) restriction and 1 of the 3 with ECM denied milk, developed oedema (kwashiorkor). Kwashiorkor (without typical dermatosis) was also diagnosed in 3 other eczematous children; 2 of them who had poor diet. In all the 4 children with kwashiorkor the skin lesions were covered with pus. Kwashiorkor resulting from restriction of protein in an otherwise normal child considered allergic to milk, has been reported[1]. It is also recognised that infections can precipitate kwashiorkor in the pre-kwashiorkor child[12]. It appeared that kwashiorkor was precipitated by infected eczema in these 4 cases while milk withdrawal in 1 and poor diet in 2 of them were other contributors.

Clinically and aetiologically, the cases with eczematous dermatitis could be grouped into scabetic, microbic, seborrhoeic, atopic and irritant dermatitic (The proportion of cases in these groups should not, however, be taken into account as the study was based on selected cases). Varying proportions in these groups were malnourished, apparently more due to presence of secondary infections than due to poor diet. The aetiological factors in this series of cases have been described earlier[13].

Besides the nutritional failure as assessed by the anthropometric data, clinical signs of malnutrition were few. Variable wasting was seen in the anthropometric groups of malnutrition and only 4 had stomato-glossitis. As discussed earlier, pitting oedema was present in 4.

A comparison of the degree of malnutrition (anthropometric) with the duration of eczema showed poor correlation and in the causation of malnutrition and its severity, the duration of eczema

appeared less important than associated infections and adequacy of diet. Eczematous children were anaemic but not more so than 'normal' controls. The most important biochemical evidence that they suffered from protein malnutrition was, that the mean serum albumin level was significantly low in all eczematous groups including those considered not malnourished on anthropometric basis. The total serum protein level was significantly depressed in those with chronic malnutrition only.

The various possible mechanisms by which eczematous dermatitis may cause malnutrition have been mentioned in the introduction but these remain to be elucidated. The present study showed that a high proportion (83%) of eczematous children were anthropometrically, clinically and biochemically malnourished. In view of the multifactorial background in which malnutrition usually occurs, it is extremely difficult to determine the precise role of eczematous dermatitis in the causation but it appears to be a significant one particularly as 12 out of 13 children with eczematous dermatitis from higher income families were malnourished. The observations suggest that the malnutrition results mostly from secondary infection and occasionally from dietary protein restriction.

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References

1. Taitz LS and Finberg L : Kwashiorkor in Bronx, Amer J Dis Child, 1966; 12 : 76-78.
2. Domonkos AN: Contact dermatitis, drug eruptions, atopic dermatitis and eczema, Andrew's Diseases of the skin, 6th Ed. Edited by Domonkos AN, W.B. Saunder's Co., Philadelphia, 1971, P. 84.
3. Sehgal VN and Rege VL : A retrospective study of exfoliative dermatitis, Ind J Dermatol Venereol, 1974; 40 : 36-39.
4. Waldmann TA, Wochner RD, Laster L and Gordon S : Allergic gastroenteropathy. A cause of excessive gastrointestinal protein loss, New Eng J Med, 1967; 276 : 761-769.
5. Walker-Smith J : Cow's milk protein intolerance : Transient food intolerance of infancy, Arch Dis Child, 1975; 50: 347-350.
6. Kuitumen P, Visakerpi JK, Savilahti E and Pelkone P : Malabsorption syndrome with cow's milk intolerance, Arch Dis Childhood, 1975 ; 50 : 351-356.
7. Scrimshaw NS, Taylor CE and Gordon JE : Interactions of Nutrition and Infection, WHO Monograph series No. 57, Geneva, 1968.
8. Jelliffe DB : The assessment of the nutritional status of the community, WHO Monograph series No. 53, Geneva, 1966.
9. Waterlow JC : Classification and definition of protein - calorie malnutrition, Brit Med J, 1972; 3 : 566-569
10. Bhattacharyya AK : Pre-kwashiorkor, Bull Cal Sch Trop Med, 1973; 21 : 17-18.
11. Bhattacharyya AK : Studies on kwashiorkor and marasmus in Calcutta (1957-74). I aetiological and clinical studies, Ind Ped, 1975 ; 12 : 1103-1113.
12. Bhattacharyya AK and Mandal JN : Precipitants of kwashiorkor, Bull Cal Sch Trop Med, 1966 ; 14 ; 48-49.
13. Bhattacharyya SK and Banerjee AK : Eczema infants and children, aetiological and clinical observations, Indian J Dermatol Venereol Lepr, 1978 ;44 : 214-217.