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Methods

Children between one week and 23 months of age with acute illness were enrolled and stratified by anthropometry. Standardized photographs were taken, and three dermatologists assessed skin changes and scored each child according to the SCORDoK tool and SCORDoK descriptions (Table 1).

Table 1: SCORDoK Definitions

SCORDoK Skin Change	Description
Telogen effluvium (TE)	Loss of hair Yes (if present) and No (if absent)
Pigmentary changes (PC)	Any and all pigmentary changes on the skin observed (Hypo- and Hyper-pigmentation) Yes (if present) and No (if absent)
Ichthyosiform skin changes (ISC)	Grade 1: Dry hyperpigmented skin with prominent skin lines and grayish scale Grade 2: Hyperkeratotic areas and thick grayish scales Grade 3: Hard to shiny hyperpigmented thick scaling which leave erosions on detachment
Lichenoid skin changes (LSC)	Grade 1: 1 to 5mm hyperpigmented to purple-brown flat papules Grade 2: variable sized hyperpigmented, hyperkeratotic and lichenified well defined plaques Grade 3: Thicker infiltrated plaques which may be shiny. May detach, leaving erosions or intact epidermis beneath
Bullae, erosions and desquamations (BED)	Grade 1: presence of bullae, erosions and desquamation affecting <5% body surface area Grade 2: presence of bullae, erosions and desquamation affecting 5-30% body surface area Grade 3: presence of bullae, erosions and desquamation affecting >30% body surface area

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Rationale

Since first documentation (figure 1) of skin changes in malnutrition in the early 18th century, various hair and skin changes have been reported in severely malnourished children globally. We aimed to describe the frequency and types of skin conditions in children admitted with acute illness to Queen Elizabeth Central Hospital, Blantyre, Malawi across a spectrum of nutritional status and validate an existing skin assessment tool.

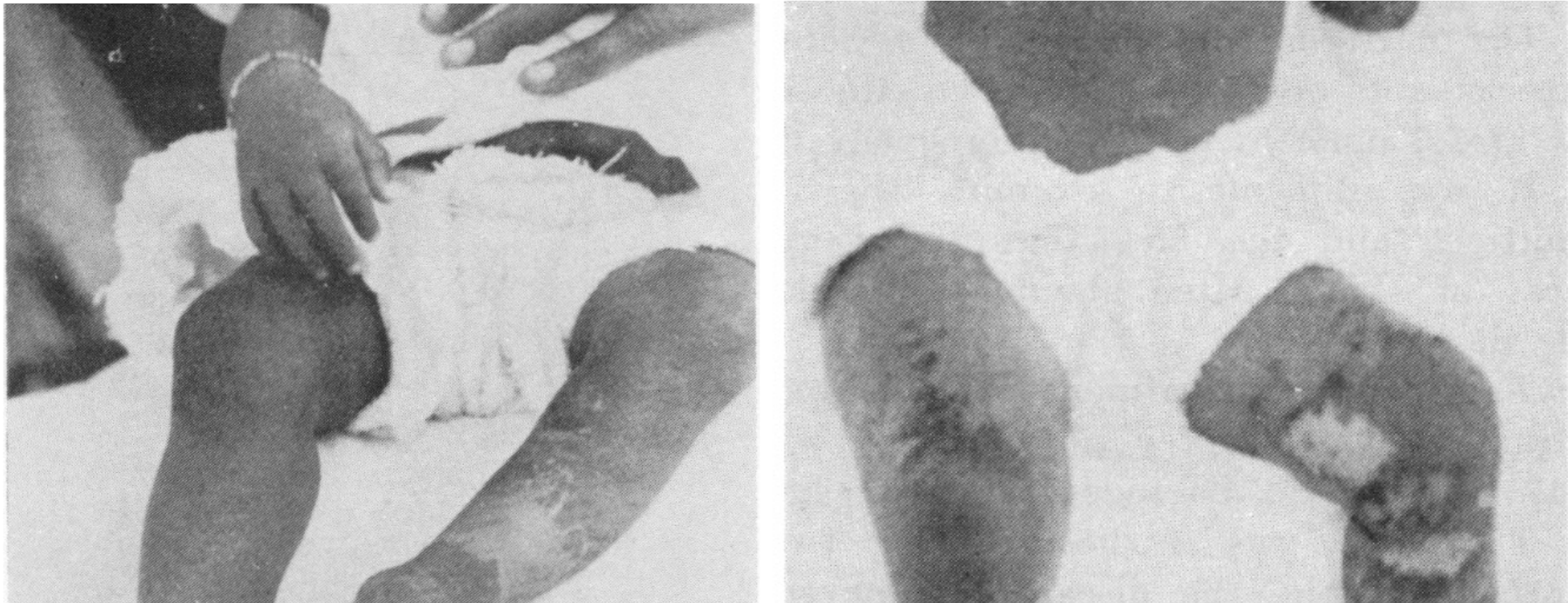


Figure 1: Williams CD. A nutritional disease of childhood associated with a maize diet. Arch Dis Child. 1983;58(7):550-560. doi:10.1136/adc.58.7.550; Heilskov S, Vestergaard C, Babirekere E, et al. Characterization and scoring of skin changes in severe acute malnutrition in children between 6 months and 5 years of age. J Eur Acad Dermatology Venereol. 2015;29(12):2463-2469. doi:10.1111/jdv.13328

In 2015, Heilskov et al. identified a lack of standardized terminology used in the literature making it difficult to describe the global prevalence or even correctly characterize the skin changes due to malnutrition. They devised a scoring tool (SCORDoK, figure 2) to identify skin manifestations and used it to predict mortality among children admitted to hospital with severe malnutrition in Uganda.

SCORDoK
Standardised clinical score of skin manifestation in SAM

ID: _____ Phase: Admission ☐ Transition ☐ Discharge ☐

Body surface area

Skin manifestation	No	Yes
Telogenic effluvium		
Pigmentary changes		

	Grade		
	I	II	III
Ichthyosiform skin change			
Lichenoid skin change			
Bullae - Erosions- Desquamations			

Figure 2 Standardized score for skin changes in severe acute malnutrition. Copyright number: TXu 1-948-432.

Table 2: Baseline characteristics of 103 children enrolled in skin CHAIN study

	All	KW	SW	MW	NW	p-value
N (%)	103	11 (10.7)	31 (30.1)	20 (19.4)	41 (39.8)	
Mean age in months [SD]	12.4 (±5.9)	19.1 (±4.1)	11.1 (±6.1)	10.5 (±5.1)	11.9 (±5.8)	<0.001
WLZ [SD]	-1.4 (±1.8)	-1.6 (±1.3)	-3.2 (±1.1)	-1.5 (±1.3)	0.1 (±1.1)	<0.001
MUAC [SD]	12.5 (±1.9)	12.3 (±1.2)	10.5 (±1.1)	12.3 (±0.6)	14.3 (±1.1)	<0.001
HIV antibody positive (%)	18 (17.5)	1 (9.1)	8 (25.8)	7 (35.0)	2 (4.9)	0.01
Sex=male (%)	63 (61.2)	5 (45.5)	20 (64.5)	14 (70.0)	24 (58.5)	0.56
Mortality (%)	6 (5.8)	0	5 (16.1)	1 (5.0)	0	0.03
Diarrhoea (%)	48 (46.6)	6 (54.5)	17 (54.8)	11 (55.0)	14 (34.1)	0.24
Skin changes according to SCORDoK:						
TE* (%)	20 (19.4)	5 (45.5)	9 (29.0)	5 (25.0)	1 (2.4)	0.002
PC (%)	35 (34.0)	8 (72.7)	7 (22.6)	7 (35.0)	13 (31.7)	0.03
ISC (%)	2 (1.9)	0	0	0	2 (4.9)	0.38
LSC (%)	1 (1.0)	1 (9.1)	0	0	0	0.04
BED (%)	18 (17.5)	6 (54.5)	9 (29.0)	1 (5.0)	2 (4.9)	<0.001

Results

Among 103 children (table 2), median age 12 months, 31 (30%) had severe wasting, 11 (11%) kwashiorkor (nutritional edema) and 18 (17%) a positive HIV antibody test. Six (5.8%) of the included patients died. Fifty-one (50%) of children presented with at least one skin change. Pigmentary changes were commonest, observed in 35 (34%), with hair loss and bullae, erosions and desquamation the second most prevalent skin condition.

Common diagnoses were congenital dermal melanocytosis, diaper dermatitis, eczema, and post-inflammatory hyperpigmentation. Severe skin changes like flaky paint dermatosis were rarely identified. Inter-rater variability calculations showed only fair agreement (overall Fleiss Kappa 0.25), while intra-rater variability had fair-moderate agreement (Cohen’s Kappa score of 0.47-0.58).

Conclusions

Most common diagnoses were common dermatosis, as seen globally in infants

Low rate of inter- and intra-rater reliability

Low prevalence of skin dermatoses associated with malnutrition