Case Report

Kwashiorkor: A Case Series from Miri General Hospital, Sarawak – An Under-Recognized Public Health Concern

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ABSTRACT

Background: Severe acute malnutrition (SAM) remains an important contributor to childhood morbidity and mortality globally. Kwashiorkor is frequently under-recognized because clinical oedema conceals tissue wasting and distorts body weight measurements, leading to initial diagnostic oversight in primary care settings.

Aim: To describe the clinical presentation, contributory socio-environmental factors, management, and recovery outcomes of four pediatric patients diagnosed with kwashiorkor at Miri General Hospital, Sarawak, during an 11-month study period from July 2025 to May 2026.

Case Description: Four infants aged 4–8 months presented between July 2025 and May 2026 with kwashiorkor and varied clinical manifestations including generalized bilateral pitting oedema, severe hypoalbuminemia (16–19 g/L), acute infections, global developmental delay, diarrhea, and dermatoses. Case 1 (detected July 2025) involved a 7-month-old girl presenting with generalized fungal skin infection and severe hypoalbuminemia following condensed milk substitution. Case 2 (detected October 2025) was an 8-month-old Penan girl presenting with febrile status epilepticus secondary to bronchopneumonia and global developmental delay associated with prolonged exclusive breastfeeding and unsupplemented starch ('Linut') feeding in a remote rural settlement. Case 3 (detected January 2026) involved a 4-month-old boy presenting with fungal intertrigo and bilateral otitis media related to condensed milk prepared with rainwater under poor hygienic conditions. Case 4 (detected May 2026) was an 8-month-old girl presenting with generalized infected eczema and diarrhea secondary to extreme dietary restriction for suspected multiple food allergies.

Conclusion: Kwashiorkor is an under-recognized public health concern in Sarawak. This series highlights three key distinctive features: presentation in young infants (<1 year), diverse socio-environmental pathways to protein energy deficit, and masking by non-nutritional acute medical complaints. Routine assessment for bilateral pitting oedema, systematic anthropometric evaluation (including height/length and MUAC), and culturally appropriate caregiver education are essential in primary care.

Keywords: Kwashiorkor; Severe acute malnutrition; Pediatric nutrition; Bilateral pitting oedema; Complementary feeding; Sarawak; Malaysia

INTRODUCTION

Severe acute malnutrition (SAM) remains a critical determinant of pediatric morbidity and mortality worldwide. According to the World Health Organization (WHO) clinical classification, SAM encompasses two major distinct clinical entities: marasmus (characterized by severe tissue wasting without oedema, weight-for-height Z-score <−3 SD) and kwashiorkor (characterized by pathognomonic bilateral pitting oedema, hypoalbuminemia, hepatic

steatosis, and dermatoses) (World Health Organization, 2013). Per WHO diagnostic criteria, the presence of bilateral pitting oedema in a child with malnutrition is independently diagnostic of SAM, regardless of weight-for-height anthropometrics.

While stunting and chronic undernutrition are recognized national public health priorities in Malaysia—with the National Health and Morbidity Survey (NHMS 2023) documenting a stunting prevalence of 21.2% among children under five years of age—edematous severe acute malnutrition remains under-reported and under-recognized, particularly in East Malaysia. In primary care practice, nutritional assessment frequently relies on standard weight-for-age growth charts. However, nutritional oedema artificially inflates body weight, effectively masking underlying muscular wasting and leading clinicians to misinterpret the severity of malnutrition.

It is important to emphasize that while bilateral pitting oedema serves as the cardinal diagnostic criterion for kwashiorkor, increased susceptibility to severe secondary infections (such as sepsis, bronchopneumonia, and extensive dermatological infections) represents a secondary metabolic and immunological consequence resulting from impaired cell-mediated immunity, mucosal atrophy, and micronutrient depletion. Over an 11-month observation period from July 2025 to May 2026, Miri General Hospital identified four distinct pediatric cases of kwashiorkor. This case series highlights the heterogeneity of clinical presentations, socio-environmental determinants, and diagnostic challenges in Sarawak.

METHODS

Study Design and Setting

This is a retrospective descriptive case series conducted at Miri General Hospital, a major tertiary referral healthcare facility in Sarawak, East Malaysia. Miri General Hospital serves as the principal referral center for northern Sarawak, encompassing urban, suburban, rural, and highly remote interior indigenous settlements across the Miri, Limbang, and Baram divisions.

Study Period and Patient Population

The study evaluated pediatric inpatient records and referral logs over an 11-month observation period from July 2025 to May 2026. The target population comprised all pediatric patients under 2 years of age presenting with edematous severe acute malnutrition (kwashiorkor). During this timeframe, four infants aged between 4 and 8 months were identified and systematically evaluated.

Diagnostic Criteria

Diagnosis was established strictly according to the World Health Organization (WHO) clinical classification criteria for severe acute malnutrition (World Health Organization, 2013). The primary inclusion criterion was the clinical presence of pathognomonic bilateral pitting oedema (pedal, lower limb, or generalized soft tissue swelling) in the presence of severe undernutrition. Per WHO guidelines, bilateral pitting oedema

independently establishes a diagnosis of edematous SAM (kwashiorkor) regardless of initial weight-for-height or weight-for-age Z-scores. Laboratory confirmation required marked hypoalbuminemia (serum albumin <20 g/L; cohort range: 16–19 g/L).

Differential Diagnosis and Exclusionary Protocol

To confirm primary nutritional kwashiorkor, non-nutritional causes of generalized or bilateral peripheral oedema were systematically investigated and excluded in all four patients upon admission:

Renal pathology / Nephrotic syndrome: Excluded via serial normal urinalysis (negative for proteinuria/hematuria), normal serum urea, and normal serum creatinine levels.

Hepatic failure / Synthetic dysfunction: Excluded via normal total and conjugated serum bilirubin, normal alanine aminotransferase (ALT), and normal aspartate aminotransferase (AST).

Congestive heart failure: Excluded via clinical cardiac examination, absent murmur/gallop rhythm, normal liver edge span, and structural evaluation where indicated.

Protein-losing enteropathy: Systematically investigated and ruled out through detailed stool evaluation and resolution following nutritional replacement.

Organic neurological / Infectious etiologies: For patients presenting with neurological involvement (e.g., Case 2 presenting with febrile status epilepticus), comprehensive workups—including neuroimaging (brain MRI), electroencephalography (EEG), lumbar puncture with CSF analysis, and tuberculosis screening—were performed and confirmed unyielding.

Data Collection and Variables

Clinical data were extracted retrospectively from inpatient medical records, intensive care logs, primary care follow-up files, and mobile health clinic records. Key standardized variables recorded included:

Demographics & Socio-Environmental Determinants: Age, sex, ethnicity, geographic locality/remoteness (e.g., urban Miri, rural wooden village, or remote Penan interior settlement like Long Kerong), caregiver status, and detailed dietary histories (breastfeeding duration, timing and type of complementary feeding, condensed milk substitution, unboiled rainwater usage, or restrictive elimination diets).

Anthropometrics: Admission body weight (kg), length (cm), and mid-upper arm circumference (MUAC, cm), evaluated against WHO child growth standards (Z-scores). Longitudinal tracking was maintained during nutritional rehabilitation to record therapeutic fluid-loss weight drop and establish true dry weight.

Laboratory & Specialized Investigations: Serial serum albumin (g/L), full blood count, organ function panels, and specialized immunologic tests (serum total IgE and allergen-specific food sensitization panels where indicated).

Clinical Management & Recovery: Therapeutic milk formulations (F-75, F-100, Neocate), antimicrobial interventions, intensive care support, dermatological treatments (including targeted biological therapy), caregiver nutritional education, and post-discharge growth trajectories.

Ethical Considerations

Ethical approval and institutional consent were obtained in accordance with clinical research guidelines, with administrative approval granted by the Director General of Health Malaysia. All patient data were anonymized to ensure confidentiality.

Case Presentations

Case 1 (Detected July 2025)

A 7-month-old Iban girl residing near Miri city was referred to Miri General Hospital in July 2025 for a severe, generalized fungal skin infection. She was born late preterm at 35 weeks and 4 days gestation with a low birth weight of 2.41 kg. Her mother was a housewife, and her father worked odd jobs. Detailed physical examination upon admission revealed extensive generalized fungal skin lesions accompanied by bilateral pitting oedema of the lower limbs. Anthropometric evaluation demonstrated severe undernutrition with a body weight of 5.19 kg (<−3 SD), length of 61 cm (<−3 SD), and mid-upper arm circumference (MUAC) of 10.5 cm (<−3 SD). Initial laboratory investigations revealed severe hypoalbuminemia (18 g/L). Non-nutritional causes of bilateral oedema—including nephrotic syndrome/renal impairment (normal urinalysis, serum urea, and creatinine), hepatic failure (normal bilirubin and transaminases), congestive heart failure (normal cardiac examination), and protein-losing enteropathy—were systematically excluded.

Dietary history identified that exclusive breastfeeding was discontinued at 3 months when the mother temporarily relocated to Sibu to care for an ill family member. The primary caregiver, her grandmother, substituted breast milk with condensed milk diluted in water, and complementary weaning foods had not been introduced by 7 months. The patient developed severe dehydration and required Pediatric Intensive Care Unit (PICU) admission for cautious rehydration, electrolyte stabilization, antimicrobial therapy, and structured nutritional rehabilitation with milk formulations. The mother returned to participate in inpatient feeding education. Upon initiation of nutritional therapy, the patient lost her fluid-retention weight (decreasing from 5.19 kg to a nadir of 4.80 kg), confirming the magnitude of fluid masking. Following discharge, she demonstrated sustained catch-up growth, improving from below the red zone to the white zone on the WHO growth chart within six months, and was successfully discharged from the weight gain clinic.

Case 2 (Detected October 2025)

An 8-month-old Penan girl weighing 4.61 kg (<−3 SD; height 60 cm, <−3 SD; MUAC 10.0 cm, <−3 SD) presented in October 2025 with febrile status epilepticus secondary to severe bronchopneumonia, requiring emergency endotracheal intubation and mechanical ventilation. She was born SGA with a birth weight of 2.0 kg

to a multiparous mother (Para 6). Following neurological stabilization, clinical examination revealed global developmental delay, facial puffiness, and bilateral pitting pedal oedema. Laboratory evaluation demonstrated marked hypoalbuminemia (19 g/L). Organic neurological, infectious, and metabolic etiologies for developmental delay and seizures, including neuroimaging (MRI brain), electroencephalography (EEG), lumbar puncture, and comprehensive tuberculosis screening—were unyielding.

The patient family resides in Long Kerong, Baram, an extremely remote Penan settlement approximately eight hours distant via logging camp roads, accessible primarily by the Flying Doctor Service. Due to geographic isolation, the community relied on a restricted staple diet. Dietary assessment revealed prolonged exclusive breastfeeding supplemented solely with 'Linut' (a sago-based, protein-deficient starch preparation), without complementary protein sources. Alternative organ failure and non-nutritional oedema were ruled out. She underwent inpatient multidisciplinary nutritional rehabilitation, developmental stimulation, and maternal counselling. Given the logistic barriers to hospital follow-up, post-discharge care was coordinated with primary care mobile clinics to conduct home visits and deliver nutritional food baskets. Her growth trajectory improved into the yellow zone of the WHO growth chart.

Case 3 (Detected January 2026)

A 4-month-old Malay boy was referred from a primary care clinic in January 2026 after healthcare staff noted severe fungal intertrigo and bilateral otitis media during routine vaccination. Upon presentation to Miri General Hospital, generalized body swelling with bilateral pitting pedal oedema was identified. Anthropometric measurements confirmed severe undernutrition (weight 4.68 kg, <−3 SD; length 57 cm, <−3 SD; MUAC 10.2 cm, <−3 SD) with a serum albumin of 17 g/L. Comprehensive diagnostic workup confirmed normal renal function (urinalysis negative for proteinuria), normal hepatic enzymes, and normal cardiac structure, excluding non-nutritional oedema.

Born term with a normal birth weight of 3.0 kg, the infant lived in an impoverished, crowded wooden house in a rural village one hour from Miri. Both parents were unemployed and lacked personal transport. Detailed feeding history revealed that the infant was fed condensed milk prepared with unboiled harvested rainwater, compounded by poor bottle hygiene. Inpatient management encompassed cautious nutritional rehabilitation, systemic antimicrobials, hygiene education, and social work intervention. Primary care teams subsequently conducted home supervisory visits. Following nutritional recovery, his weight reached the normal 50th centile for age, and he was discharged from clinic follow-up.

Case 4 (Detected May 2026)

An 8-month-old girl presented in May 2026 with generalized, severe infected eczema and persistent chronic diarrhea. She was born at term weighing 2.8 kg. On physical examination, generalized soft tissue swelling and bilateral pitting pedal oedema were observed. Initial weight was 6.2 kg (~−2 SD; length 64 cm, <−2 SD;

MUAC 11.5 cm, <−2 SD), and serum albumin was 16 g/L. Normal renal, hepatic, and cardiac evaluations ruled out organ failure.

Due to persistent maternal apprehension regarding perceived food allergies, complementary weaning foods were severely restricted, limiting protein intake to infrequent, minute portions of chicken alongside reduced breastmilk production. Laboratory investigations revealed markedly elevated serum total IgE (>5000 kU/L) and multiple food sensitizations. Management involved elemental amino acid-based formula (Neocate) supplementation, dermatological management with topical therapy and subcutaneous dupilumab, pediatric immunology co-management, and structured weaning education. During inpatient rehabilitation, loss of nutritional oedema led to a transient weight drop from 6.2 kg (−2 SD) to a true dry weight of 5.6 kg (<−3 SD), illustrating how oedema can mask severe anthropometric deficits. Following therapy, her skin dermatitis resolved, diarrhea ceased, and growth parameters fully normalized.

DISCUSSION

Originality and Distinctive Features of the Case Series

This case series contributes novel insights into the clinical spectrum of kwashiorkor in East Malaysia, presenting three distinctive features compared to classical literature:

Young Infant Demographic: While classic epidemiological descriptions locate kwashiorkor predominantly in post-weaning toddlers aged 1–3 years, all four cases in this series occurred in young infants aged 4–8 months.

Heterogeneous Socio-Environmental Determinants: Rather than generalized famine, protein deficits stemmed from localized cultural practices, including condensed milk feeding due to maternal absence, geographic isolation with sago monodiets ('Linut') among Penan communities, poverty with unboiled rainwater usage, and extreme elimination diets for perceived allergies.

Diagnostic Masking by Acute Complications: All infants presented primarily with non-nutritional acute complaints (seizures, fungal dermatoses, eczema, otitis media) that obscured underlying nutritional deficits.

Clinical Recognition of Bilateral Pitting Oedema and Diagnostic Pitfalls

Bilateral pitting oedema is the cardinal diagnostic hallmark of kwashiorkor, resulting from hypoalbuminemia, altered capillary permeability, and oxidative stress (World Health Organization, 2013). Clinical reliance on serial weight measurements without physical examination for pitting oedema creates a major diagnostic vulnerability. Edematous fluid accumulation inflates total body mass, causing anthropometric measurements to falsely cluster in the −2 SD range rather than <−3 SD. When therapeutic fluid loss occurs during nutritional rehabilitation, true dry weight drops significantly, exposing severe underlying tissue wasting.

Correlation Between Stunting and Kwashiorkor

The high national stunting prevalence (21.2% per NHMS 2023) reflects chronic, long-term nutrient deficits across Malaysian children. Chronic stunting establishes a state of fragile metabolic adaptation with reduced muscle mass and depleted micronutrient stores. When a chronically stunted infant experiences an acute dietary stressor—such as abrupt transition to condensed milk, sago monodiets, or severe restrictive feeding—or an intercurrent infection, homeostatic adaptation collapses. This precipitates acute hypoalbuminemia and rapid development of bilateral pitting oedema, transforming chronic undernutrition into acute kwashiorkor.

Enhancing Frontline Clinical Awareness

Initial under-recognition of kwashiorkor in primary care highlights the need for ongoing clinical education. Re-evaluating frontline training programs to emphasize routine pedal oedema checks, complete MUAC measurement, and thorough dietary histories during routine infant health visits is vital to improving early detection across Sarawak.

Conclusion

Kwashiorkor remains an under-recognized presentation of severe acute malnutrition in Sarawak. Systematic physical examination for bilateral pitting oedema, comprehensive anthropometric assessment (height and MUAC), and proactive dietary evaluation is critical to early diagnosis. Multidisciplinary management combining therapeutic nutrition, infection control, and caregiver education yields excellent clinical recovery.

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Conflict of Interest

The authors declare no conflict of interest.

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Ethical Approval

Ethical approval and informed consent were obtained in accordance with institutional requirements.

Summary Table of the Case Series

Table 1 Outlines the demographic, clinical, anthropometric, laboratory, and outcome parameters across the four cases observed between July 2025 and May 2026 at Miri General Hospital.

Variable	Case 1 (Jul 2025)	Case 2 (Oct 2025)	Case 3 (Jan 2026)	Case 4 (May 2026)
Age / Sex	7-month-old girl	8-month-old girl	4-month-old boy	8-month-old girl
Birth History	Late preterm (35+4 wk), LBW 2.41 kg	LBW 2.0 kg, SGA (Para 6)	Term, BW 3.0 kg	Term, BW 2.8 kg
Socio-Environmental Background	Iban; near Miri; temporary maternal absence	Penan; Long Kerong Baram (8-hr logging road); Flying Doctor access	Malay; rural village; severe poverty; crowded living	Urban; maternal anxiety regarding food allergies
Dietary History	Condensed milk post-3 mos; no complementary foods	Prolonged breastfeeding; complementary limited to 'Linut' starch	Condensed milk with unboiled rainwater; poor bottle hygiene	Exclusive breastfeeding; extreme elimination diet (tiny chicken portions)
Admission Anthropometrics	Weight 5.19 kg (<−3 SD) Length 61 cm (<−3 SD) MUAC 10.5 cm (<−3 SD)	Weight 4.61 kg (<−3 SD) Length 60 cm (<−3 SD) MUAC 10.0 cm (<−3 SD)	Weight 4.68 kg (<−3 SD) Length 57 cm (<−3 SD) MUAC 10.2 cm (<−3 SD)	Weight 6.20 kg (~−2 SD) Length 64 cm (<−2 SD) MUAC 11.5 cm (<−2 SD)
Differential Exclusion of Oedema	Renal, hepatic, cardiac, enteric causes excluded	Renal, hepatic, cardiac, CNS causes excluded	Renal, hepatic, cardiac causes excluded	Renal, hepatic, cardiac causes excluded
Laboratory Findings	Serum albumin 18 g/L	Serum albumin 19 g/L; EEG, MRI, TB workup normal	Serum albumin 17 g/L	Serum albumin 16 g/L; IgE >5000 kU/L; food sensitisation
Presenting Features	Generalised fungal skin infection, bilateral pedal oedema	Febrile status epilepticus, bronchopneumonia, intubated, delay, pedal oedema	Fungal intertrigo, bilateral otitis media, generalised oedema	Generalised infected eczema, chronic diarrhoea, pedal oedema
Primary Intervention	PICU, rehydration, F-75/F-100, antimicrobials, feeding counselling	Nutritional rehabilitation, multidisciplinary care, mobile team food baskets	Nutritional rehabilitation, antimicrobials, hygiene counselling, social support	Elemental formula (Neonate), dermatology, Dupilumab, immunology referral
Clinical Outcome	Fluid loss (5.19→4.8 kg), catch-up growth into white zone	Catch-up growth into yellow zone; mobile clinic visits	Weight restored to 50th centile; discharged from clinic	Fluid loss (6.2→5.6 kg dry weight), skin and weight normalised

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