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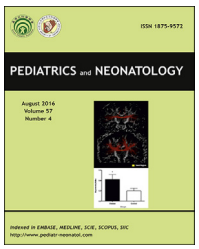

ORIGINAL ARTICLE

The Prevalence of Undernutrition upon Hospitalization in Children in a Developing Country: A Single Hospital Study from Malaysia

Way-Seah Lee [a,b,*], **Zulfadly Ahmad** [a]

[a] *Department of Paediatrics, University Malaya Medical Center, Kuala Lumpur, Malaysia*
[b] *University Malaya Paediatric and Child Health Research Group, University Malaya, Kuala Lumpur, Malaysia*

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Key Words
hospitalization;
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Background: Undernourished children who require hospital care have a longer duration of hospitalization and respond poorly to modern medical therapy. The objective of the present study was to ascertain the nutritional status of children admitted to a pediatric tertiary center in Malaysia and the risk factors leading to undernutrition upon admission.
Methods: In this cross-sectional, hospital-based study, anthropometric measurements [weight, length/height, mid-upper arm circumference (MUAC), triceps skinfold thickness were performed in 285 children aged from 3 months to 15 years who were admitted to University Malaya Medical Centre, Kuala Lumpur in November 2013. Acute (wasting) and chronic (stunting) undernutrition were defined as weight-for-height (WFH) and height-for-age (HFA) < -2 standard deviation (S.D.), respectively. Underweight was defined as weight-for-age < -2 S.D. For children aged between 1 and 5 years of age, World Health Organization definition for acute undernutrition (HFA < -2 S.D. and/or MUAC < 12.5 cm) was also noted.
Results: Upon admission, the prevalence rates of acute and chronic undernutrition were 11% ($n = 32$) and 14% ($n = 41$), respectively. In addition, 7% ($n = 21$) had an MUAC of $<$ 12.5 cm, 15% had body-mass index < -2 S.D., and 7% ($n = 21$) had triceps skinfold thickness < -2 S.D., while 17% ($n = 47$) were underweight. Using the World Health Organization definition of acute undernutrition, an additional eight patients were noted to have acute undernutrition ($n = 40$, 14%). No significant risk factors associated with undernutrition were identified.
Conclusion: The prevalence of undernutrition among children admitted to a tertiary hospital in Malaysia was 14%. Strategies for systematic screening and provision of nutritional support in

* Corresponding author. Department of Paediatrics, University Malaya Medical Center, 59100 Kuala Lumpur, Malaysia.
E-mail address: leews@um.edu.my (W.-S. Lee).

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children at risk of undernutrition as well as treatment of undernutrition in children requiring hospitalization are needed.

1. Introduction

Undernourished children who require hospital care are at risk of staying for a longer duration in hospital and have a worse clinical outcome as compared to children with normal nutrition.[1–4] Undernutrition in hospitalized children is common in both resource-limited as well as resource-adequate countries.[3,5] For instance, moderate-to-severe underweight and acute severe malnutrition have been associated with an increased mortality in children who required hospital care for bacterial pneumonia in Malawi, a resource-limited country.[5] By contrast, lower total body fat mass and acute and chronic undernutrition were also noted to be associated with worse clinical outcomes in children undergoing surgery for congenital heart disease in a resource-adequate setting in California.[6]

The reported prevalence of undernutrition in hospitalized children ranged from 6% to 30%,[7,8] depending on the definition for undernutrition used.[7] Commonly, weight-for-height (WFH) standard deviation scores (S.D.S.) are used for wasting or acute malnutrition while height-for-age (HFA) S.D.S are used for chronic malnutrition or stunting.[7] Body mass index (BMI) is also commonly used to describe malnutrition.[7]

Medical conditions leading to an increased risk of undernutrition in children requiring hospital care include conditions with an increased metabolic demand (chronic lung disease, cardiac failure),[8–10] increased loss or malabsorption (cystic fibrosis, chronic inflammatory bowel disease, major burns),[9,11,12] and impaired/reduced oral intake (anorexia nervosa, severe mental retardation).[13,14]

There is a relative lack of data on the prevalence of undernutrition in hospitalized children from middle income countries, such as Malaysia. The present study aimed to address this knowledge gap by determining the prevalence of and the risk factors associated with undernutrition in children admitted to an academic hospital in Malaysia.

2. Methods

The present study was a cross-sectional, observational, hospital-based study conducted in University Malaya Medical Centre (UMMC), Kuala Lumpur from November 1, 2013 to November 30, 2013. UMMC is an academic and tertiary referral hospital for Kuala Lumpur and its surrounding region. The present study was approved by the institutional ethics committee of UMMC.

2.1. Study population

Consecutive children aged between 3 months and 16 years who were admitted to the children medical wards of UMMC during the study period and who fulfilled the inclusion criteria were included. The exclusion criteria were as follows: (1) children admitted for the assessment of non-accidental injury; (2) unstable medical conditions when growth parameters could not be obtained properly; and (3) children with a known syndromic diagnosis where growth charts for normal children are not applicable.

2.2. Patient recruitment

Each morning during the study period, a list of all admissions for the preceding 24 hours from each children's medical ward was reviewed. After applying the exclusion criteria, a list of suitable patients for enrolment was prepared. The parents of all patients were approached and informed consent was obtained before the interview was conducted.

2.3. Case definitions

Acute case refers to an admission for an acute recurring or nonrecurring symptom which, when treated, can improve and return the patient to his or her premorbid state. The patient must not have severe symptoms in between episodes to affect the progression of his or her growth. He or she must also not meet the definition for "chronic case". Chronic case refers to a patient with a chronic long-standing illness requiring frequent admissions (e.g., cancer) that has an effect on weight gain or growth, or admission for symptoms present more than 28 days prior to admission. Elective admission refers to a planned admission for a medical or surgical procedure or investigation. He or she must also not meet the definition for "emergency admission". Emergency admission refers to unplanned admission for a medical or surgical procedure or for investigation.

2.4. Data collection

Basic demographic and socioeconomic data (parental education, household income) as well as medical factors (vaccination status, duration of breastfeeding, underlying diagnosis) were collected.

2.5. Anthropometric measurements

Each morning, weighing scales of each ward were calibrated and stadiometers were checked prior to taking anthropometric measurements. To ensure standardization, all measurements were performed by a single investigator. The following anthropometric measurements were obtained: height, weight, mid-upper arm circumference

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