

Concurrent Wasting and Stunting among Under-Five Children: A Five-Year Hospital-Based Study in Aden

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Abstract

Introduction: Wasting and stunting can co-exist in the same setting and occur within the same child. Both share common risk factors and each increase the risk for developing the other, that is being wasted may increase the risk of subsequent stunting and vice versa. This study was conducted with the aim to evaluate the frequency of stunting among severely wasted hospitalized children.

Methods: This is a retrospective study used data generated from Severe Acute Malnutrition (SAM) registries of children 06–59 months old with complicated severe wasting admitted to the Therapeutic Feeding Center's (TFC) of Al-Sadaka teaching hospital, Aden, Yemen during five years period (2018 through 2022).

Results: A total of 1461 severely wasted children were admitted during 2018-2022. Severe stunting was seen in 42.5%, and severe plus moderate stunting were seen in 63.8% of the total severely wasted children. Findings related to age group revealed that more than 90% of the severely wasted children were from 06-24 months and 58.6% of them were also stunted.

Conclusions: The study findings provide evidence of co-existence, early in life, of stunting among severely wasted children. Wasting and stunting both need to be addressed simultaneously to reduce associated short- and long-term irreversible consequences.

Keywords: Severe wasting, Stunting, Concurrence, Under-five children.

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الهزال والتقرم المتزامن بين الأطفال دون سن الخامسة : دراسة لخمس سنوات في المستشفى في عدن

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ملخص الدراسة

المقدمة: يمكن أن يتواجد الهزال والتقرم في نفس البيئة وفي نفس الطفل. ولكلاهما عوامل خطر مشتركة ويزيد كل منهما من خطر الإصابة بالآخر، وقد يؤدي الهزال إلى زيادة خطر الإصابة بالتقرم والعكس صحيح. أجريت هذه الدراسة بهدف تقييم تواتر التقرم لدى الأطفال المصابين بالهزال الشديد المرقد في المستشفى.

المنهجية: هذه دراسة استرجاعية مبنية على الملاحظة استخدمت بيانات سجلات سوء التغذية الحاد الوخيم (SAM) للأطفال الذين تتراوح أعمارهم بين ستة إلى تسعة وخمسين شهراً والذين يعانون من هزال شديد المرقد في مركز التغذية العلاجية (TFC) بمستشفى الصداقة التعليمي، عدن، اليمن خلال خمس سنوات (2018 إلى 2022).

النتائج: بلغ عدد الأطفال المصابين بالهزال الشديد والمرقد في مركز التغذية العلاجية خلال فترة الدراسة 1461. وشوهد التقرم الشديد في 42.5%، والتقرم الشديد والمتوسط في 63.8% من إجمالي الأطفال المصابين بالهزال الشديد. وبناء على الفئة العمرية، كشفت النتائج أن أكثر من 90% من الأطفال المصابين بالهزال الشديد كانوا من الفئة العمرية 06-24 شهراً وأن 58.6% منهم يعانون أيضاً من التقرم.

الخلاصة: تقدم نتائج الدراسة دليلاً على تزامن التقرم لدى الأطفال الذين يعانون من الهزال الشديد في وقت مبكر من الحياة. لذا، فإنه يجب التعامل ومعالجة الهزال والتقرم معاً وفي وقت واحد للتقليل من العواقب والمضاعفات القصيرة والطويلة المدى المرتبطة بهما والتي لا رجعة فيها.

الكلمات المفتاحية: الهزال الشديد، التقرم، التزامن، الأطفال دون سن الخامسة.

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Introduction

Childhood undernutrition is a major public health problem among children in developing countries. It can affect physical and intellectual growth and is also considered as the main cause of child morbidity and mortality [1]. High degrees of malnutrition have been reported in Yemen with an estimated 2.2 million are suffering from acute malnutrition including over 540,000 children with severe acute malnutrition (SAM) and 35.1 % are suffering from stunting [2].

Anthropometric measurement of children has been broadly used to identify wasting and stunting, the two distinct manifestations of child undernutrition. Wasting, defined as a weight-for-length/height (WFL/H) Z-score that is more than two standard deviations below the median of the World Health Organization (WHO) standards for child growth, is considered an indicator of acute undernutrition that is amenable to treatment and has long been the focus of humanitarian interventions that aim to reduce the immediate risk of death associated with wasting complications. Stunting, defined as length/height-for-age Z score (L/HFA Z) more than two standard deviations below the median, is an indicator of chronic undernutrition and has a long-term effect on cognitive development, educational performance and economic productivity in adulthood and on maternal reproductive outcomes. Stunting has traditionally been the focus of development organizations that seek to monitor linear growth faltering [3,4].

Wasting and stunting can co-exist in the same setting and occur within the same child [5]. Both manifestations of acute and chronic undernutrition share common risk factors, including infection, poor infant and young child feeding practices, inadequate diet, food insecurity, and poor maternal health and nutrition [6,7]. There is growing evidence of an inter-relationship between wasting and stunting, such that being wasted may increase the risk of subsequent stunting and vice versa [8]. Importantly, evidence suggests that children with both wasting and stunting are at a greatly elevated risk of death [9]. Despite the potential for inter-relationships and common risk factors, little is known about the co-existence of stunting among severely wasted children in Al-Sadaka General Teaching hospital; the major referral pediatrics hospital in Aden and adjacent governorates. Therefore, this study was conducted with the aim to evaluate the frequency of stunting among severely wasted hospitalized children.

Methods

Study design and setting

This is retrospective study used data generated from the SAM registries of the Therapeutic Feeding Center (TFC) of Al-Sadaka General Teaching hospital, Aden, Yemen during a five-year period (2018 through 2022).

Inclusion criteria

Children 06–59 months old with severe wasting, defined as weight for length/height three standard

deviations below the median (WFL/H < -3 SD z-score) of the WHO standards for child growth, with associated medical complications Reference [4].

Exclusion criteria

Children beyond the age range, admitted for severe wasting by mid-upper arm circumference (MUAC) criterion, having edema, history of perinatal insult (birth asphyxia/trauma/ intraventricular hemorrhage (IVH)/ kernicterus etc.), history of NICU admissions in the neonatal period, evolving central nervous system disease, gross malformation or secondary malnutrition.

Data collection

The following data were recorded at the time of admission in a pre-structured data sheet: age in months (mo.), weight in kilogram (kg), and length/height in centimeters (cm). The (2006) WHO Child Growth Standards, age and sex specific, was used to assess every child's length-for-age (LFA) Z-scores (children younger than 24 months or less than 87 cm length) and height-for-age (HFA) Z-score (children aged 24 month or more, or more or equal 87 cm height) [10]. A L/HFA Z scores < -3 SD and < -2 SD units from the median of the reference population were considered as severe and moderate stunting, respectively. A L/HFA Z-score \geq -2 SD units from the median of the reference population was considered normal length/height for age. The study population were divided into three age groups 06-12 months, 13-24 months, and 25-59 months.

Statistical analysis

Analysis was carried with IBM SPSS Statistics for Windows, version 24 (IBM Corp., Armonk, NY, USA). Numerical data were described as mean \pm SD. Frequency tables with percentages were used for categorical variables. A *p*-value < 0.05 is considered statistically significant.

Ethical considerations

Permission to conduct the study was obtained from the management office of Al-Sadaka General Teaching Hospital, Aden. Patient identifiers were not included; therefore, no ethical harm was inflicted on the patients.

Results

A total of 1461 severely wasted children were admitted during the study period. The mean \pm SD age (months), weight (kg), and length/height (cm) of the study population were nearly similar during the five-year period as shown in Table1.

The overall means \pm SD of age, weight, and length/height were 13.44 \pm 8.50 (months), 5.45 \pm 1.38 (kg), and 68.60 \pm 7.48 (cm), respectively.

Table 1: Mean \pm SD of Age, Weight, and Length/Height of Study Population

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Variable	2018 N=225		2019 N=317		2020 N=262		2021 N=352		2022 N=305		*P
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Age (months)	13.91	9.06	13.80	9.77	13.42	8.56	13.06	7.78	13.16	7.36	0.683
Weight (kg)	5.48	1.48	5.44	1.52	5.45	1.27	5.45	1.31	5.44	1.32	0.998
Length/Height	68.48	8.14	68.59	8.30	68.62	6.84	68.69	7.22	68.55	6.93	0.998

*ANOVA test.

Figure 1 shows that severe stunting was found in 42.5%, whereas severe plus moderate stunting were seen in

63.8% of the total severely wasted children. Nearly one third of the children were not stunted.

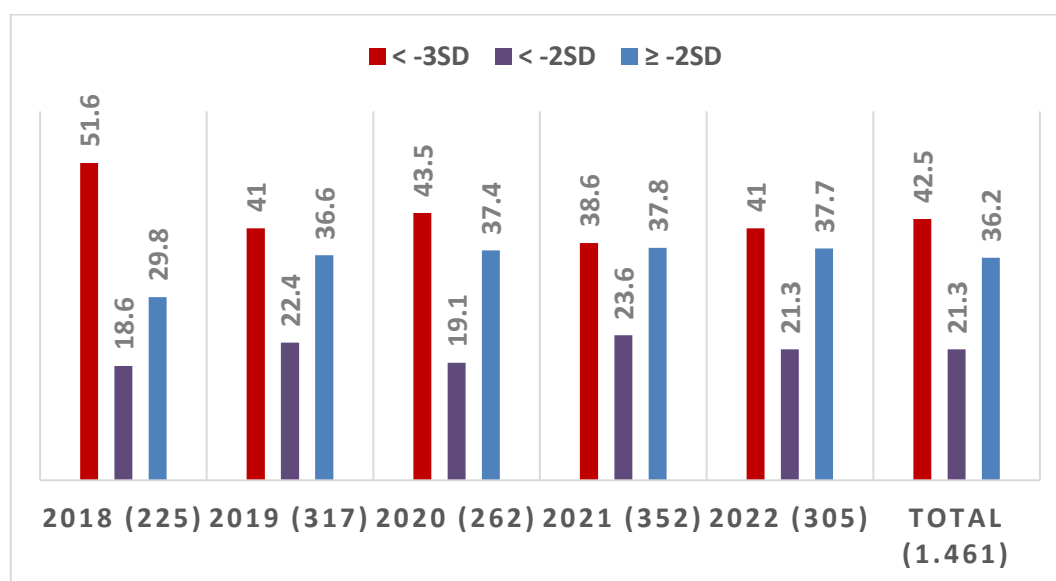


Figure 1: Severe stunting, moderate stunting, and no stunting among severely wasted children.

Based on age groups, 63.6% of the admitted severely wasted children belonged to the age group 06-12 months with more than 90% were 06-

24 months, among them 37.4% and 58.6% were also concurrently stunted (moderate and severe), respectively as seen in Table2.

Table 2: Frequency of stunting among severely wasted children based on age groups during the study period*

Age Groups (mo.)	2018 N=225			2019 N=317			2020 N=262			2021 N=352			2022 N=305			2018 - 2022 Total=1461		
	< -2	≥ -2	Total	< -2	≥ -2	Total	< -2	≥ -2	Total	< -2	≥ -2	Total	< -2	≥ -2	Total	< -2	≥ -2	Total
06-12	86 (38.2)	46 (20.5)	132 (58.7)	134 (42.3)	84 (26.5)	218 (68.8)	95 (36.2)	78 (29.8)	173 (66.1)	122 (34.7)	99 (28.1)	221 (62.8)	109 (35.8)	76 (24.9)	185 (60.7)	546 (37.4)	383 (26.2)	929 (63.6)
13-24	57 (25.3)	18 (8.0)	75 (33.3)	48 (15.1)	25 (7.9)	73 (23.0)	53 (20.2)	19 (7.2)	72 (27.4)	83 (23.6)	28 (7.9)	111 (31.5)	69 (22.6)	38 (12.5)	107 (35.1)	310 (21.2)	128 (8.8)	438 (30.0)
25-59	15 (6.7)	3 (1.3)	18 (8.0)	19 (6.0)	7 (2.2)	26 (8.2)	16 (6.1)	1 (0.4)	17 (6.5)	14 (4.0)	6 (1.7)	20 (5.7)	12 (3.9)	1 (0.3)	13 (4.2)	76 (5.2)	18 (1.2)	94 (6.4)
Total	158 (70.2)	67 (29.8)	225 (100.0)	201 (63.4)	116 (36.6)	317 (100.0)	164 (62.6)	98 (37.4)	262 (100.0)	219 (62.2)	133 (37.8)	352 (100.0)	190 (62.3)	115 (37.7)	305 (100.0)	932 (63.7)	529 (36.2)	1461 (100.0)

*Figures in parentheses are percentages

Discussion

Wasting and stunting both occur when nutrient intakes are insufficient to meet the requirements for growth and/or to support the immune response to infection. In addition, these two forms of malnutrition are closely related, often occur together in the same population and often in the same children, and are both associated with increased mortality, especially when both are present in the same child [11].

The study findings during 2018-2022 show that children were having nearly similar means and standard deviations of age, weight, and length/height and 42.5% had both severe stunting in addition to severe wasting. A hospital-based study in Egypt revealed that 13.8% of children had concurrent wasting and stunting [12].

In a related context, a cross-sectional survey in Ethiopia found that 4.7 % of children had concurrent wasting and stunting [13].

The high frequency of concurrent wasting and stunting in the present study might be attributed to the fact that acute malnutrition, that is estimated to be 2.2 million in Yemen, was not addressed appropriately at an early age, when development occurs faster than at any age, which predispose children to develop stunting [14].

There is a global agreement on a critical window, from conception through the first 2 years of life, within which 70% of stunting occurs. Growth faltering that not addressed during the window of opportunity, becomes largely irreversible and the deficit continues to deteriorate till the age of five due to sustained exposure to unpleasant

environmentally modifiable factors related to feeding, infections and psychosocial care. [3,9,14-16].

The present study shows that more than 90% of the severely wasted children belonged to the age group 06-24 months which is higher than finding of a hospital-based study in Ethiopia (67%) [17].

Among this age group, concomitant stunting were found in 58.6%, which is much higher than the frequency of stunting among severely wasted 06-24 month old children in a study included hospitalized children in Nepal (4.7%)[18] and a community-based study done in Vellore, India (14.1%) [19].

In the Yemeni context, malnutrition in this age group mostly related to improper complementary feeding practice. According to SMART surveys conducted in 2021, only one in 10 children aged 6-23 months in Yemen receives an adequate diet in the complementary feeding period, with only 12% receiving a minimum acceptable diet. High levels of poverty, spiraling food prices, poor access to services, and the constraints on the daily lives of women, such as movement restriction and challenges accessing financial services, all present challenges to following recommended complementary feeding practices. A lack of knowledge on age-appropriate behaviours and a lack of interaction with children during meals have also been highlighted as barriers to appropriate practice [20].

Limitation: This is a hospital-based study done in a single TFC in Aden, Yemen. In addition, because of its retrospective nature and the limited

data generated from the SAM registries, we cannot eliminate the effects of confounding variables as multiple factors contribute to childhood stunting (child related, maternal, household, environmental and community factors), therefore, caution is advised in interpreting the findings of this study.

Conclusion

The study findings provide evidence of co-existence, early in life, of stunting among severely wasted children. Wasting and stunting both need to be addressed simultaneously to reduce associated short- and long-term irreversible consequences. Researchers, policy makers, and nutrition program implementers are required to evaluate integrated approaches to address wasting and stunting in order to reduce child undernutrition. Further studies have to be conducted in other TFC in Yemen including evaluation of the determinants of wasting and stunting are recommended.

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