

Lackness in Identifying Severe Acute Malnutrition by Using Mid Upper Arm Circumference as Stand Alone Marker

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Abstract:

Objective: To identify severe acute malnutrition by using mid upper arm circumference alone as per WHO cut offs.

Methods: Cross sectional study conducted at Institute of Child Health and Hospital for children and ICDS centres, Chennai district for the period of one year from 2020 to 2021.

Results: Among 1432 screened children 531 babies found to be severe acute malnutrition as per WHO Weight for Height Z Scoring. Among them 154 have less than 11.5 cms of MUAC. It found to have low sensitivity of 28.63% and specificity of 99.78%. The positive predictive value was 98.7% and the negative predictive value was 70.34%, with an accuracy of 73.39%

Conclusion: MUAC alone cannot be taken as indicator of severe acute malnutrition, 29% SAM only can be identified by MUAC in this study. The sensitivity of mid upper arm circumference can be improved by increasing cut-off values.

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Introduction

Malnutrition in children is widely prevalent in India [1]. It leads to highest morbidity and mortality in infants and under-fives [3]. As per National Family Health Survey Five (2021) - under 5 mortality 22.5% / 1000 population among the under-five severely wasted (weight for height) 5.5/1000 population, stunted 2.5/1000 and wasted 14.6/1000 [2]. The spectrum of malnutrition varies from wasted, severely wasted and stunted.

Mid upper arm circumference (MUAC) is a simple and cheap method to assess malnutrition and more sensitive [4]. A two-step model has also been put forward suggesting MUAC as a screening tool at the community level, followed by both MUAC and weight for height measurements at health care facility with both indicators being used independently to diagnose severe acute malnutrition [5].

WHO endorses MUAC as a suitable tool for identifying severe acute malnutrition. MUAC as compared to the weight for height based measurements confess several advantages and many agencies are using MUAC as a basis for admitting children to feed program [7]. A multicentre study conducted 2014 also supported the change in MUAC cut off from <11 cms to <

11.5cms to identify children at greatest risk of resulting from severe wasting [8]. A racial difference has been observed in body composition of children, there is need to validate the cut off separately for Indian children. The current study was undertaken using MUAC as a standalone marker to assess severe acute malnutrition.

Methods

This cross sectional study was conducted at Institute of Child Health and Hospital for Children, Chennai and ICDS centres in Chennai district for a period one year from September 2020 to September 2021. Study population was children aged between 6 to 59 months of age.

Children less than 6 months of age and associated with co morbidities like CHD, CKD, and metabolic diseases were excluded. The calculated positive sample size with 0.61% true positive predictive value, 0.25% precision and 80% desired confidence interval was 489. The weight for length and MUAC are measured as per WHO standard and plotted in WHO growth chart.

Results

Overall, cross tabulation of weight for height and MUAC for all screened children gives the P value

of < 0.0001. Out of 1432 children 901(62.9%) were properly nourished and 531 were malnourished, out of which 377 had a MUAC >11.5 CMS and 154

had a MUAC < 11.5 CMS[cms]. Among 1278 children with MUAC> 11.5 cms, 901 were properly nourished while 377 were SAM cases.

Table 1: Cross tabulation of the entire population-

		Weight / Height SAM Cross tabulation			
		SAM		Total	Total
		No	Yes		
Weight / Height	<11.5	Count	0	154	154
		% Within Weight / Height	0.0%	100.0%	100.0%
	>11.5	Count	901	377	1278
		% Within Weight / Height	70.6%	29.4%	100.0%
Total		Count	901	531	1432
		% Within Weight / Height	62.9%	37.01%	100.0%

<0.0001

Discussion

When assessing severe acute malnutrition, the WHZ and MUAC showing significant gap between them to diagnose SAM. So it's quiet difficult to identify SAM children in nutritional rehabilitation programs. The average age of the participants in this study was 24 months. As compared to gold standard test (weight for height), MUAC < 11.5cm was found to have sensitivity of 28.63% and specificity of 99.78%. The positive predictive value was 98.7%and the negative predictive value was 70.34%with an accuracy of 73.39%. Only 29% SAM cases could be identified from total 531 positive cases.

This explains that single parameter cannot be used to screen the nutritional status of fewer than 5 children. Marion fiorentins et al, suggested current MUAC cut offs to screen for acute malnutrition need to be adopted for gender and age. Laillou et al, advocate using a MUAC cut off of 13.3cm to screen for SAM in children aged 6 months to 5 years. The MUAC alone does not appear to be sufficient for diagnosing SAM. It should be used in conjunction with other indicators such as weight for height and bipedal oedema.

Conclusion

This study concludes that using mid upper arm circumference as a standalone marker to screen severe acute malnutrition cannot be taken as a sole indicator. Only 29% of SAM cases were identified by using MUAC. Because of high specificity it can be used as a morbidity indicator. In field level screening to identify severe acute malnutrition cases along with MUAC, weight for height and bilateral pedal oedema also should be taken to diagnose severe acute malnutrition.

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