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Original Research Article

Severe and moderate acute malnutrition detection in a rural hospital pediatric outpatient clinic and their comparison with the IAP charts: a two-year study

Deepali Abhijit Ambike, Sandhya Vishal Haribhakta*, Subhash Shankar Poyekar, Aishwarya Santosh Pingley, Jyotsna Madhu Naidu

Department of Paediatrics, M.I.M.E.R Medical College, Talegaon Dabhade, Pune, Maharashtra, India

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***Correspondence:**
Dr. Sandhya Vishal Haribhakta,
E-mail: sandhyaharibhakta@live.com

ABSTRACT

Background: Children with moderate acute malnutrition (MAM) have an increased list of mortality, infections and impaired physical and cognitive development compared to well-nourished children. The Objectives of this study were to diagnose Severe Acute Malnutrition (SAM) and Moderate Acute Malnutrition (MAM) using WHO growth charts as a criterion and to compare the WHO classification with the IAP classification in the diagnosis of SAM and MAM.
Methods: A two-year duration cross-sectional study conducted in Pediatric outpatient clinic of a rural hospital from January 2013 to December 2014. In case of moderate acute malnutrition (MAM) was diagnosed as weight-for-height >-3 but <-2 Z scores of the median according to WHO growth standards. We defined MAM as mid-upper am circumference (MUAC) of >11.0 cm and <12.5 cm with no bilateral pitting edema and SAM as MUAC less than 11.5 cm. We compared the values with the IAP charts for diagnosis of malnutrition. Our set up is not a nutrition rehabilitation centre, feeding programmes were not implemented.
Results: The distribution of prevalence of SAM and MAM differs significantly across three age groups studied (P-value <0.001). However, it did not differ significantly between boys and girls aged between 6 months to 6 years (P-value >0.05). Of 90 SAM cases, 55 cases (61.1%) had Grade 1 IAP grade of malnutrition, 28 cases (31.1%) had Grade 2 IAP grade of malnutrition, 7 cases (7.8%) had Grade 3 IAP grade of malnutrition. None of the SAM cases fell in Grade 4 IAP. The distribution of prevalence of SAM and MAM differs significantly across various IAP grades of malnutrition (P-value <0.001).
Conclusions: The IAP charts used for diagnosing malnutrition did not have any comparative value with the WHO charts used for the SAM MAM detection. WHO grading of SAM and MAM is more sensitive than IAP grading in early diagnosis of under nutrition and facilitate early treatment. Not having a targeted nutrition-specific intervention to address MAM in this set up places these children with MAM at excessive risk of adverse outcomes. Further preventive and curative approaches should urgently be considered.

Keywords: IAP chart, Moderate acute malnutrition, MUAC, Severe acute malnutrition, WHO growth charts

INTRODUCTION

United Nation's Children Fund (UNICEF) estimated malnutrition (45%) to be the most common cause of under-five mortality, with India and Nigeria accounting for more than one-third of the deaths.[1] In India, prevalence of severe acute malnutrition (SAM) is 6.4% in children below 5 years with 100 focus districts having high prevalence of malnutrition being situated in 6 states:

Bihar, Jharkhand, Madhya Pradesh, Rajasthan, Orissa and Uttar Pradesh.[2,3] For proper utilization of funds and manpower, there is phase-wise implementation of nutritional rehabilitation centers (NRC) in these areas by UNICEF. It is important to identify the treatment outcome from these existing nutritional rehabilitation centers. Moderate acute malnutrition (MAM), defined as having a weight-for-height Z-score (WHZ) <-2 and >-3 without edema, affects 11% of the children worldwide under the age of 5 years.[1] Children with MAM are not only at 3 times greater risk of death than well-nourished children but also face greater risk of morbidity from infectious diseases and delayed physical and cognitive development.[1,2] According to National Family Health Survey (NFHS) III there are nearly 57 million undernourished children in India which is 1/3 of the world's share.[1] In India, 5 million children die every year due to direct or indirect influence of malnutrition (1 child death for every 10 seconds).[2]

Moderate acute malnutrition (MAM) is more prevalent than severe acute malnutrition (SAM) and affects approximately 64% of all those categorized as having acute malnutrition.[1] Children with MAM do not yet display the same degree of wasting and other clinical complications as those with SAM, although the causes are thought to be similar. However, patients with MAM are also in a highly vulnerable state and need to be treated before their condition progresses to SAM. Compared to well-nourished children, children with MAM have a three-fold increased risk of mortality, increased risk of infections, and impaired physical and cognitive development.[2] Whilst the contribution of SAM to global mortality and morbidity has been widely recognized with resulting international treatment protocols, the management of MAM remains debated.[3-8] Despite much efforts in the recent years to harmonize the understanding of MAM and its management, consensus is still not reached, especially in non-emergency and relatively food secure settings of low and middle income countries.[6,7,9,10] Targeted Supplementary Feeding Programmes (TSFPs) are the most commonly used approach for treating MAM.[9] Current strategies of preventing MAM are even more diverse, tackling the underlying causes of undernutrition through a combination of food security, behavioral change, water and sanitation, medical, cash-based, and surveillance approaches. There is an incomplete evidence base for their effectiveness.[9] There is no local data available for prevalence of SAM and MAM in Talegaon (D). Weight from age data from Integrated Child Development Scheme cannot give information on same. Hence, we planned a cross-sectional descriptive study with the primary objective to determine the prevalence of SAM and MAM. This is the first study to report the prevalence of SAM and MAM from Talegaon General Hospital and their comparison with the standard IAP charts for detecting malnutrition.

METHODS

Considering the feasibility in our set up we conducted a cross-sectional study on the patients attending the outpatient Pediatric clinic in Talegaon Hospital from January 2013 to December 2014.

Age was confirmed through immunization cards. Salter electronic baby and toddler scale, model 914 was used to weigh the children. Seca 214 portable stadiometer and Infantometer (Mfd. by ISO 9001:2000 Co.) were used to measure height and length respectively. Weight was measured to the nearest 10 g and height/length to the nearest millimeter. Mean of two heights/lengths was taken. WHO growth charts based on WHO child growth standards were used for determining the status of malnutrition and categorized as normal-green zone, Moderate Acute Malnutrition (MAM) as yellow zone and Severe Acute Malnutrition SAM as red zone. These children were further compared with the IAP growth standards. The sick patients who needed admission were admitted and treated for the disease conditions and nutritional counselling given and discharged after adequate weight gain and cure of the diseases.

RESULTS

A total of 13735 patients attending the Paediatric outpatient clinic were screened for undernutrition by both WHO and IAP charts over two years. Out of which 13281 children were normal, 364 were diagnosed as MAM and 90 were diagnosed as SAM by WHO classification.

Table 1: The distribution of prevalence of SAM and mam according to age.

Age Group (years)	SAM (n=90)		MAM (n=364)		Normal (n=5077)		Total (n=13735)		
	n	%	n	%	n	%	n	%	P-value
6 Months to 1 year	25	0.5	50	1.0	4797	98.5	4872	100.0	0.001***
1-3 years	33	0.6	171	3.2	5099	96.2	5303	100.0	
3-6 years	32	0.9	143	4.0	3385	95.1	3560	100.0	
Total	90	0.6	364	2.6	13281	96.8	13735	100.0	

Values are n (% of cases); P-value by Chi-Square test; ***P-value<0.001.

Of 4872 cases aged between 6 months to 1 year, 25 cases (0.5%) had SAM and 50 cases (1.0%) had MAM. Of 5303 cases aged between 1 - 3 years, 33 cases (0.6%) had SAM and 171 cases (3.2%) had MAM. 3560 cases aged between 3-6 years, 32 cases (0.9%) had SAM and 143 cases (4.0%) had MAM. In total, of 13735 cases aged between 6 months to 6 years, 90 cases (0.6%) had SAM and 364 cases (2.6%) had MAM.

The distribution of prevalence of SAM and MAM differs significantly across three age groups studied (P-value <0.001).

Table 2: The distribution of prevalence of SAM and MAM according to sex.

Sex	SAM (n=90)		MAM (n=364)		Normal (n=5077)		Total (n=13735)		
	n	%	n	%	n	%	n	%	P-value
Male	53	0.7	179	2.4	7141	96.9	7373	100.0	0.136^{NS}
Female	37	0.6	185	2.9	6140	96.5	6362	100.0	
Total	90	0.6	364	2.6	13281	96.8	13735	100.0	

Values are n (% of cases); P-value by Chi-Square test; NS: Statistically non-significant (P-value >0.05)

Table 3: The distribution of prevalence of SAM and MAM according to IAP grades of malnutrition.

IAP Grades	SAM (n =90)		MAM (n =364)		All (n =454)		
	n	%	n	%	n	%	P-value
Grade 1	55	61.1	291	79.9	346	76.2	0.001***
Grade 2	28	31.1	64	17.6	92	20.3	
Grade 3	7	7.8	8	2.2	15	3.3	
Grade 4	0	0.0	1	0.3	1	0.2	
Total	90	100.0	364	100.0	454	100.0	

Values are n (% of cases); P-value by Chi-Square test; ***P-value<0.001.

Of 7373 boys, 53 boys (0.7%) had SAM and 179 boys (2.4%) had MAM. Of 6362 girls, 37 girls (0.6%) had SAM and 185 girls (2.9%) had MAM.

The distribution of prevalence of SAM and MAM did not differ significantly between boys and girls aged between 6 months to 6 years (P-value>0.05). Of 90 SAM cases, 55 cases (61.1%) had Grade 1 IAP grade of malnutrition, 28 cases (31.1%) had Grade 2 IAP grade of malnutrition, 7 cases (7.8%) had Grade 3 IAP grade of malnutrition. None of the SAM cases fell in Grade 4 IAP. Of 364 MAM cases, 291 cases (79.9%) had Grade 1 IAP grade of malnutrition, 64 cases (17.6%) had Grade 2 IAP grade of malnutrition, 8 cases (2.2%) had Grade 3 IAP grade of malnutrition and 1 case (0.3%) had Grade 4 IAP grade of malnutrition.

With IAP Grade 1, 30 cases (14.2%) had SAM and 181 cases (85.8%) had MAM. Of 92 cases with IAP Grade 2, 28 cases (30.4%) had SAM and 64 cases (69.6%) had MAM. Of 15 cases with IAP Grade 3, 7 cases (46.7%) had SAM and 8 cases (53.3%) had MAM. Only 1 case had IAP Grade 4 and it also had MAM. The distribution of prevalence of SAM and MAM differs significantly across various IAP grades of malnutrition (P-value <0.001).

DISCUSSION

This is the first report on the extent of prevalence of MAM and SAM in Talegaon rural hospital set up of a pediatrics OPD which indicates a high prevalence of MAM as compared to SAM. There are very few studies in India with similar findings. Only one study in Ethiopia by James et al report similar findings, but they included supplementary feeding programme which was not included in our study.[5] However, majority of studies report prevalence of SAM more than MAM.

The Prevalence of MAM and SAM was highest among the age group of 1-3 years in the present study which could be attributed to increasing growth demands during this rapid period of growth and lack of necessary calorie and protein rich food due to ignorance in weaning and proper feeding. These findings are similar to study conducted by Bhupeshwari et al from AIIMS Bhopal.[7] However during the age group 6 months to 1 year the prevalence of MAM and SAM both was lowest which may be due to the protective factors in breast milk. This finding is contradictory to a study by Shankar et al.[8]

Though sex distribution was not significant (P value >0.05), again prevalence of MAM was more than SAM in both sexes.

We also compared our WHO diagnostic charts with IAP charts to diagnose malnutrition which was our second objective of the study. None of our SAM cases fell in Grade 4 IAP classification; 61.1% in Grade 1, 31.1% in Grade 2 and 78% in Grade 3 IAP classification. Similarly, among MAM cases, only one case (0.3%) fell in IAP Grade 4 class, 2.2% in Grade 3, 17.6% in Grade 2

and 79.9% fell in Grade 1 IAP Class. Overall under nutrition was diagnosed more by WHO classification than IAP classification. We got these similar findings as seen by Bhupeshwari et al in the AIIMS Bhopal study and somewhat close to the Assam study by Shareef et al who used MUAC for age- Z score charts to compare with IAP charts.[6,7]

CONCLUSION

The IAP Charts used for diagnosing malnutrition did not have any comparative value with the WHO charts used for the SAM MAM detection. WHO grading of SAM and MAM is more sensitive than IAP grading in early diagnosis of under nutrition and facilitate early treatment. IAP classification diagnosed more cases with Grade 1 and 2 PEM and WHO classification diagnosed more cases of MAM than SAM in the present study. Not having a targeted nutrition-specific intervention to address MAM in this set up places these children with MAM at excessive risk of adverse outcomes. Further preventive and curative approaches should urgently be considered.

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