

Original Research Article

Evaluation of anthropometric indicators in malnourished children at Nutritional Rehabilitation Center, Gujarat, India

Dhara Patel, Nisha Upadhyay*

Department of Paediatrics, GMERS Medical College and Hospital, Gandhinagar, Gujarat, India

Received: 03 April 2019

Accepted: 31 May 2019

***Correspondence:**

Dr. Nisha Upadhyay,

E-mail: dharapatel88@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: It is very difficult to recognize the cases with mild-to-moderate malnutrition because clinical criteria for their diagnosis are imprecise and are difficult to interpret accurately. The objective of the study was daily weight gain in gram/kg/day in severely malnourished children.

Methods: This was a hospital based cross sectional study in which total of 114 consecutive patients of SAM less than 5 years treated for complications of severe acute malnutrition using WHO protocol. The study design included 114 children from the NRC and then followed up the period of 6 months to assess the nutritional status during the period of initial stage and the entire follow up period using available record of anthropometry indicators of the admitted children recruited in the study at the NRC.

Results: Mean weight at admission was 6.4 Kg, 6.5 Kg and 6.2 Kg of overall, boys and girls respectively. Mean weight at discharge was 6.8 Kg, 6.7 Kg and 6.6 Kg of overall, boys and girls respectively. Mean MUAC at admission was 10.7 cm, 10.9 cm and 10.6 cm of overall, boys and girls respectively. Mean MUAC at discharge was 10.9 cm, 10.9 cm and 10.8 cm of overall, boys and girls respectively.

Conclusions: For treatment of severe acute malnutrition, systematic guidelines required, thus this study indicates that following WHO guidelines, it has become easier to manage SAM in hospital settings, with least possible stay at hospital. The objective of the study was to know the effect of nutritional intervention measures on selected anthropometric indicators of severe acute malnourished children.

Keywords: Malnutrition, MUAC, Under five children, Weight

INTRODUCTION

In developing countries, malnutrition is identified as a main health problem and pediatric age group is most vulnerable to its consequences. It is very difficult to recognize the cases with mild-to-moderate malnutrition because clinical criteria for their diagnosis are imprecise and are difficult to interpret accurately.^{1,2} Nutritional status of children is the common factor to identify the nutritional status of the entire community. Adequate nutrition during

infancy and early childhood is fundamental to the development of each child's full human potential. For the promotion of children's optimal growth, health and behavioural development, early childhood is a critical window.³

For the developing countries including India, malnutrition and growth retardation are most common health and nutritional problems. PEM is the most fatal form of malnutrition. It is mostly observed particularly in children

under five years of life. It is not only an important cause of childhood morbidity and mortality but leads also to permanent impairment of physical and possibly, of mental growth of those who survive.^{4,5} In India almost half of children under five years of age (48 percent) are stunted and 43 percent are underweight. The proportion of children who are severely undernourished is also notable, 24% according to height-for-age and 16 percent according to weight for-age as per NFHS-3. Even though severe under nutrition is more pronounced in states like Bihar, Madhya Pradesh, Orissa, Uttar Pradesh and Rajasthan, even in well-endowed states like Kerala, Goa and Sikkim the levels of mild under nutrition is unacceptably high.⁶ In Kerala, 23% of children are under weight, 27% stunted and 16 % wasted.⁷ So, the present study conducted with the objective to study daily weight gain in gram/kg/day in severely malnourished children.

METHODS

This was a hospital based prospective study in which total of 114 consecutive patients of SAM less than 5 years treated for complications of severe acute malnutrition using WHO protocol were enrolled and their course during hospitalization including complications and outcome were followed and recorded. Study was conducted during November 2012 to October 2014 after ethical permission of Institutional Ethical Committee. Inclusion criteria for study participants were MUAC <115 mm with or without any grade of oedema, weight for height <-3SD with or without any grade of edema, Bilateral pitting oedema +/+ (children with edema +++always need inpatient care, all patients with visible severe wasting with or without edema are included. Exclusion criteria were patient who stayed less than 7 days in nutrition ward are excluded, SAM patient with medical complications like congenital heart disease, cerebral palsy, inborn error of metabolism, tuberculous meningitis, seropositive immunodeficient patients etc. The study population comprised of children less than 5 years of age, having weight for height/length ≤3 SD, with visible wasting, or bipedal oedema, with mid arm circumference <11.5 cm will be conducted in a nutritional supplementation center. The study design included 114 children from the NRC, RAJKOT (GUJARAT) and then followed up the period of 6 months to assess the nutritional status during the period of initial stage and the entire follow up period using available record of anthropometry indicators of the admitted children recruited in the study at the NRC. The data were recorded in an Excel sheet and descriptive analysis was performed by epi. Info. Software. Data were presented in the Tables and Figures.

Measurement Tool

Weight

Weight is measured using electronic weighing machine. The beam should be properly balanced and should move freely when at rest and the pointer should be on zero. The

scale should be set on a flat horizontal surface. The shoes should remove, and children should be weighed with as little clothing as custom permits. The result is read directly but only after the beam reaches its balance point.

Height

For height measurement, below the age of two years, a horizontal measuring infant meter is used which is called length. Beyond the age of two years, a vertical measuring anthropometry is used. The wall itself is graded, with the zero is located exactly at the angel formed by the ground and the wall.

Mid upper arm circumference

Measurement for MUAC is performed on the left arm, midway between the acromion and the olecranon. The measuring tape is flexible and non-stretchable and unaffected by temperature.

Head circumference

The maximum occipitofrontal circumference is measured by placing the flexible, on stretchable tape firmly over the most prominent region of occiput and frontal crests.

RESULTS

Table 1 shows that study included 40.3% boys and 59.6% girl participants. Highest number of participants (44.7%) belonged to age group 13-24 months age group followed by age group of 7-12 months (39.4%), 25-59 months (9.6%) and 4-6 months (6.1%) respectively. Most of mothers (64%) were illiterate followed by group of secondary (30.0%), higher secondary (2.5%) and graduate (1.5%) respectively. Most of fathers (54%) were working as labourer followed by shop keeper (15.7%), farmer (12.0%), worker (7.0%), mechanic (4.3%), driver (2.6%) and pharmacist (0.8%) respectively. Highest number of mothers were belonged to age group of 24-30 years followed by 18-24 age group (36.8%) and 30-36 age group (12.3%) respectively. Almost 33.3% mothers have 2 live children followed by 29.8%, 22.8%, 9.6% and 4.3% have live children 3, 1, 4 and 5 respectively.

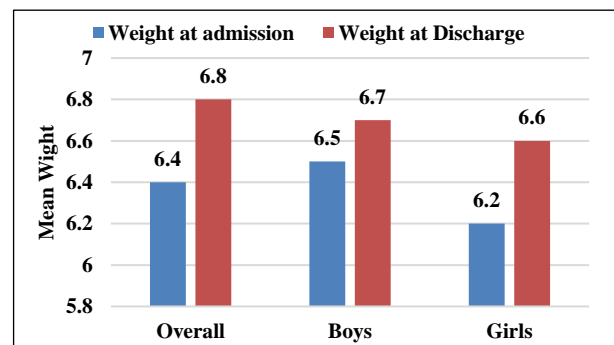


Figure 1: Mean weight at the admission and discharge (n=114).

Table 1: Clinico-social characteristics of study participants (n=114).

Variables	Number (%)
Gender	Male 46 (40.3)
	Female 68 (59.6)
Age (in months)	4-6 7 (6.1)
	7-12 45 (39.4)
	13-24 51 (44.7)
	25-59 11 (9.6)
Mother education	Illiterate 74 (64.0)
	Secondary 35 (30.0)
	Higher Secondary 3 (2.5)
	Graduate 2 (1.5)
Father's occupation	Labourer 64 (56.0)
	Farmer 14 (12.0)
	Mechanic 5 (4.3)
	Pharmacist 2 (0.8)
	Driver 3 (2.6)
	Shop keeper 17 (15.7)
	Worker 9 (7.0)
Age of mother	18-24 42 (36.8)
	24-30 58 (50.9)
	30-36 14 (12.3)
Total no. of live children	1 26 (22.8)
	2 38 (33.3)
	3 34 (29.8)
	4 11 (9.6)
	5 5 (4.3)

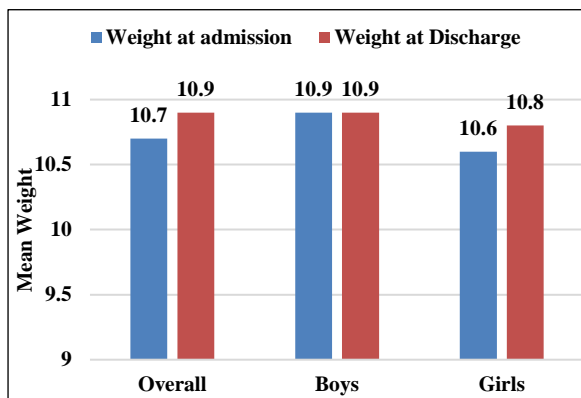


Figure 2: Mean MUAC at the admission and discharge (N=114).

Figure 1 shows that mean weight at admission was 6.4 Kg of all participants, 6.5 kg of boys and 6.2 Kg girls respectively. Mean weight at discharge was 6.8 Kg of all participants, 6.7 Kg of boys and 6.6 Kg of girls respectively. The difference between mean weight at admission and discharge was statistically significant ($p < 0.05$). Figure 2 shows that mean MUAC at admission was 10.7 cm of all participants, 10.9 cm of boys and 10.6 cm of girls respectively. Mean MUAC at discharge was 10.9 cm of all participants, 10.9 cm of boys and 10.8 cm of girls respectively. The difference between mean MUAC at

admission and discharge was statistically significant ($p < 0.05$).

DISCUSSION

The present study findings show that major proportion of severe acute malnutrition seen in girls than in boys. The sex ratio of male to female is 1:1.48 out of 114 children, these may be due to priority of feeding male child predominantly than girl child, ignorance etc. The present study findings show that major proportion of malnutrition seen in between 7 months to 24 months, due to either inadequate exclusive breast feeding in the first 6 months, delayed introduction of complementary feedings, or inappropriate complementary feeding.⁸

Weight has been taken as the main anthropometric measure as an improvement in weight of severe malnourished children has the most significant effect in reducing the mortality among them. The present study findings reveal A statistically significant difference was observed between the mean weight at discharge and the mean weight at admission in the age group of 0-6 ($t=5.00025$, $p \text{ value} < 0.05$) and 25-36 months. ($t=3.95084$, $p \text{ value} < 0.05$) overall and for boys 7-12 ($t=2.088$, $P < 0.05$) and 25-36 ($t=3.726$, $p < 0.05$) months, for girls age group 4-6 months ($t=4.939$, $P < 0.05$) separately. Colecraft EK et al, in a study at four day care NRCs also reported a significant increase in weight for age for the admitted children.⁹ Taneja G et al, study analyzed 93 children for anthropometric indicators.¹⁰ A statistically significant difference was obtained between the weight of children at admission and discharge ($t=14.552$, $P < 0.001$).

The average weight gain for the study group during their stay at the centers was 2.32 g/kg/day; for boys the average weight gain being 3.29 g/kg/day and for girls 2.32 g/kg/day which is incomparable to results observed by Savadago L et al.¹¹ In a study at Ashworth A et al, which reported an average weight gain of 10.18 ± 7.05 g/kg/day findings reported by a set of studies in Bangladesh comparing inpatient, day care and home-based treatment for severe malnourished children observed an average weight gain of 11 g/kg/day for the inpatient group and Taneja et al, in a study at Madhya Pradesh which reported an average weight gain of 9.25 ± 5.89 g/kg/day.^{10,13-15}

A recovery rate of 32.45% (children with average weight gain of more than 5 g/kg/day) was observed amongst the study group which is not acceptable as per the guidelines it should be $>50\%$ and $<50\%$ is not acceptable; recovery rate of 53.76% was observed in Taneja et al, study group recovery rate of 52.7% using the above international standards was obtained by Gaboulaud V et al., in a study comparing therapeutic feeding centers.^{10,11,16}

The mean MUAC at admission was 10.74 ± 1.06 cm and at discharge it was 10.87 ± 1.12 cm. The difference was observed to be statistically significant ($t=3.547$, $P < 0.001$). The mean MUAC for the boys at admission was

10.89±1.07 cm and at discharge it was 10.94±1.13 cm, which was not statistically significant (t=0.692, P=0.49) and for girls the mean MUAC at admission was 10.64±1.08 cm, at discharge it was 10.83±1.12 cm, the observed difference being statistically significant (t=4.976, P<0.001).

The difference between MUAC at discharge and at admission was found to be statistically significant for the entire study group (t=9.548, P<0.001), for boys (t=6.876, P<0.001) and girls (t=6.723, P<0.001) in study group of in Taneja et al¹⁰ MUAC is very easy to measure and hence should be used appropriately and judiciously for monitoring children at the NRCs.

CONCLUSION

Severe acute malnutrition is preventable and treatable cause of childhood morbidity and mortality. For treatment of severe acute malnutrition, systematic guidelines required, thus this study indicates that following WHO guidelines, it has become easier to manage SAM in hospital settings, with least possible stay at hospital. The objective of the study was to know the effect of nutritional intervention measures on selected anthropometric indicators of severe acute malnourished children.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Anwar F, Gupta MK, Prabha C, Srivastava RK. Malnutrition among rural Indian children: An assessment using web of indices. *Int J Pub Heal Epidemiol.* 2013;2(4):78-84.
2. Victora CG, Adair L, Fall C, Hallal PC, Martorell R, Richter L, et al. Maternal and child undernutrition, consequences for adult health and human capital. *Lancet.* 2008;371(9609):340-57.
3. Akhade KS. Measuring malnutrition: needs a comprehensive indicator. *Int J Comm Med Pub Heal.* 2018;5:258-61.
4. World Bank Report. India Country Overview, 2009. Available at: <http://web.worldbank.org/archive/website01291/WEB/0CON-2.HTM>. Accessed 12 March 2019.
5. Nath LR. Prevalence of malnutrition among underve children and factors contributing to malnutrition. *GJRA.* 2017;6(3):97-99.
6. Ministry of Health and Family Welfare. National Family Health Survey (NFHS-3): National Fact Sheet India (provisional data), Government of India, 2005-2006. Available at: <https://dhsprogram.com/pubs/pdf/frind3/frind3-vollandvol2.pdf>. Accessed 13 March 2019.
7. NFHS3 (national family health survey 3, NFHS-3, Kerala report. Available at: http://www.rchiips.org/nfhs/NFHS%20Data/ke_state_report_for_website.pdf. Accessed 13 March 2019.
8. KE Elizabeth. Nutrition and child development. Section-4: Triple burden of malnutrition. 4th ed. 2010:163-251.
9. Colecraft EK, Marquis GS, Bartolucci AA, Pulley L, Owusu WB, Maetz HM. A longitudinal assessment of the diet and growth of malnourished children participating in nutrition rehabilitation centres in Accra, Ghana. *Pub Heal Nutr.* 2004;7(4):487-94.
10. Taneja G, Dixit S, Khatri AK, Yesikar V, Raghunath D, Chourasiya S. A study to evaluate the effect of nutritional intervention measures on admitted children in selected nutrition rehabilitation centers of Indore and Ujjain divisions of the state of Madhya Pradesh (India). *Ind J Comm Med.* 2012;37(2):107.
11. Savadogo L, Zoetaba I, Donnen P, Hennart P, Sondo BK, Dramaix M. Management of severe acute malnutrition in an urban nutritional rehabilitation center in Burkina Faso. *Rev Epidemiol Sante Pub.* 2007;55(4):265-74.
12. Ashworth A, Chopra M, MacCoy DS, Jackson D, Karaolis N, Sogaula N, et al. WHO guideline for management of SAM in rural South African hospitals: effect on case fatality and the influence of operational factor. *Lancet.* 2004;363(9415):1110-5.
13. Khanum S, Ashworth A, Huttly SR. Growth, morbidity, and mortality of children in Dhaka after treatment for severe malnutrition: a prospective study. *Am J Clin Nutr.* 1998;67(5):940-5.
14. Khanum S, Ashworth A, Huttly SR. Controlled trial of three approaches to the treatment of severe malnutrition. *Lancet.* 1994;344(8939-8940):1728-32.
15. Ashworth A, Khanum S. Cost-effective treatment for severely malnourished children: what is the best approach?. *Health Policy Plan.* 1997;12(2):115-21.
16. Gaboulaud V, Bouzoua DN, Brasher C, Fedida G, Gergonne B, Brown V. Could nutritional rehabilitation at home complement or replace centre-based therapeutic feeding programmes for severe malnutrition?. *J Trop Pediatr.* 2007;53(1):49-51.

Cite this article as: Patel D, Upadhyay N. Evaluation of anthropometric indicators in malnourished children at nutritional rehabilitation center, Gujarat, India. *Int J Contemp Pediatr* 2019;6:xxx-xx.