

Evaluation of selected NRCs in treating SAM children: prospective study of UjjainAnil Singh Baghel¹, Rashmi Bhujade^{2*}, Arpit Verma³, Kishor Namdeo Chinchodkar⁴, Sanjay Chaurasia⁵¹Associate Professor, Department of Community Medicine, Dungarpur Medical College, India²Associate Professor, Department of Community Medicine, Zydus Medical College & Hospital, Dahod, Guajrat, India³Assistant Professor, Department of Community Medicine, R.D.Gardi Medical College Hospital, Ujjain, Madhya Pradesh, India⁴Statistician cum tutor, Zydus Medical College & Hospital, Dahod, Gujarat, India⁵ Professor & Head of department of Community Medicine in Amaltas Medical College Dewas M.P, India

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Abstract

Background: Malnutrition is a silent emergency especially in developing countries. Severe Acute Malnutrition (SAM) is a major cause of mortality in under five children, as children with SAM 9 times more likely to die than well nourish children. There is a need to treat SAM Proactively. **Method:** Follow up study was planned to inquire the impact of nutritional intervention on the physical parameters of admitted SAM children in two selected NRCs. Information was collected with the help of semi structured proforma. Data was collected for 3 months and each SAM child was followed up to 90 days for 6 points of time. Total sample size of 98 SAM children was taken. **Results:** Analysis was done with the help of SPSS version 20. ANOVA test, Tukey's multiple comparison test and Correlation were applied to demonstrate the significance between variables. Statistical significant changes in weight and MUAC were observed. Most significant change from starting weight & MUAC was observed at 3rd follow up. **Conclusion:** NRCs seem to be a promising approach in rehabilitating SAM children. Current study also added good evidence to favor above statement. Achieving long lasting improvement is our ultimate goal.

Keywords: Severe Acute Malnutrition, Nutritional Rehabilitation Center, Impact.

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Introduction

There is an intricate influence of nutrition on growth. It also plays a pivotal role in child survival. Malnutrition is a global health problem but it is more pronounce in developing countries like India. Malnutrition is one of the important cause of death & disability. Around 14.3 million children of under five years of age are severely wasted[1]. In India the prevalence of SAM (severe acute malnutrition) is 7.5 % and in Madhya Pradesh it is 9.2% [2].

Government of India started the Nutrition rehabilitation centers (NRCs) under the Bal Shakti Yojna with support from UNICEF to control malnutrition among the children under 5 years[3]. The evaluation of efficacy of NRCs in treating SAM is a need of the hour that's why current study was planned with the Aim of to assess the improvement in the nutritional status in form of weight & MUAC of SAM Children admitted in NRCs.

Methods

After taking the ethical clearance from institutional ethical committee of R.D.Gardi medical college a prospective study was conducted with the aim of to assess the effect of nutritional interventional in admitted SAM children. Eight NRCs are there in Ujjain district Madhavnagar, Ghatiya, Tarana, Ingoriya, Nagda, Badnagar, Khachrod & Mahidpur. By using simple random sampling method 2 NRCs Ghatiya and Tarana

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were chosen for study setting. Both the NRCs were 10 bedded NRCs. All the children who were admitted in selected NRCs during the three months of data collection period were included in study. Those who (parents) have not given consent for participation in study, SAM children below 6 months of age, those who were suffering from any congenital anomalies like congenital heart diseases, cerebral palsy, micro-cephaly, cleft lip & cleft palate & SAM children who had not completed their all follow up were excluded from study. Written informed consent was taken from parents of admitted study participants. Data was collected with the help of semi structured proforma. A detailed personal history, socio-demographic profile, and chosen anthropometric parameters were recorded. As anthropometric parameters are gold standard for evaluating the nutritional status & among anthropometric parameters weight & MUAC considered as most sensitive parameters. Weight was taken with the help of digital weighing machine. MUAC was measured

on the left arm midway between acromion & olecranon process[4]. Information was collected both by direct examination and with the help of NRCs Sam card, at the time of admission; discharge and 4 follow ups. As per NRC protocol[5] there are 2 admission days in a month and as both the NRCs were 10 bedded, we got 40 cases per month from both the NRCs. We collected data for 3 months so we got 120 SAM children at the initiation of study .We collected data at 6 points of time. First at admission, discharge after that in every 15 days for 4 times. At admission & discharge we had 120 SAM cases but at first follow up we lost to follow 3 children, then in 2nd follow up we lost to follow 8 SAM children, at 3rd follow up there was attrition of 8 SAM children again and at 4th follow up we missed 3 SAM children. So at the end of all 6 follow up we only could get 98 SAM children that's why 98 children were considered for final analysis.

Results

Table 1: Socio-demographic profile of study participants

		Frequency	Percent
Sex	Male	52	53.1
	Female	46	46.9
Total		98	
Caste	SC	69	70.4
	ST	8	8.2
	OBC	15	15.3
	General	6	6.1
Total		98	
Age in months	6-12	12	12.24
	13-24	26	26.53
	25-36	40	40.81
	37-48	11	11.22
	49-60	9	9.18
Total		98	
NRC	Ghatiya	46	46.93
	Tarana	52	53.06
Total		98	

Table 1 showing that 53% participants were male, maximum 70 % participants were from sc category .Around 41 % participants belonged to 25-36 months age group followed by 13-24 months that consist of 26.5 %.Approximately 53% participants were from Tarana NRC rest were from Ghatiya NRC.

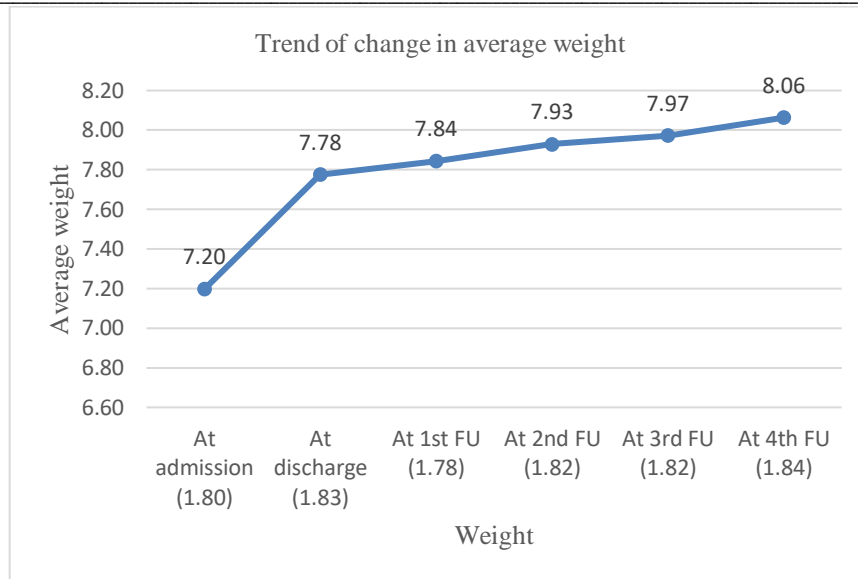


Fig 1: Change in average weight of SAM children from admission to 4th follow up

Values in bracket shows corresponding Standard deviation (SD)

Figure 1 showing visible change in average weight along with SD of SAM children in desirable direction at different point of time.

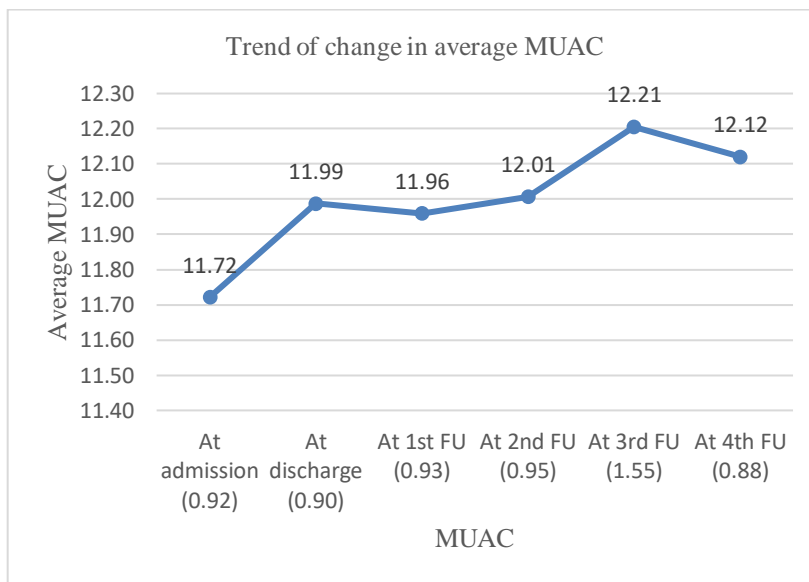


Fig 2: Change in average MUAC of SAM children from admission to 4th follow up

Values in bracket shows corresponding Standard deviation (SD)

Figure 2 showing visible change in average MUAC along with SD of SAM children in desirable direction at different point of time.

Table 2: ANOVA test for weight and MUAC

ANOVA					
Weight	Sum of Squares	df	Mean Square	F	p-value
Between Groups	47.102	5	9.420	2.861	0.015
Within Groups	1916.609	582	3.293		
Total	1963.711	587			
MUAC	Sum of Squares	df	Mean Square	F	p-value
Between Groups	13.328	5	2.666	2.422	0.035
Within Groups	640.519	582	1.101		
Total	653.847	587			

Table 2 ANOVA test was applied to see the significant changes in weight and MUAC at different point of time. It was applied for both between group and within group and it came out to be statistically significant for both weight and MUAC as p value for both are <0.05 (at 5% of level of significance).

Table 3: Tukey's multiple comparison test for weight and MUAC at 6 point of time

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	p value	95% Confidence Interval	
					Lower Bound	Upper Bound
Weight	Discharge	-0.57	0.26	0.22	-1.31	0.16
	1 st follow up	-0.64	0.26	0.12	-1.38	0.09
	2 nd follow up	-0.73	0.26	0.05	-1.47	0.01
	3 rd follow up	-0.77	0.26	0.03	-1.51	-0.03
	4 th follow up	-.086	0.26	0.01	-1.60	-0.12
MUAC	Discharge	-0.27	0.15	0.48	-0.69	0.16
	1 st follow up	-0.24	0.15	0.61	-0.67	0.19
	2 nd follow up	-0.29	0.15	0.40	-0.71	0.14
	3 rd follow up	-0.48*	0.15	0.02	-0.91	-0.06
	4 th follow up	-0.40	0.15	0.09	-0.83	0.03

Tukey's multiple ANOVA test was applied to see the changes in weight and MUAC between different point of time i.e. between weight at admission and weight at discharge and so on. Highly significant change was found between weight at admission and weight at 3rd follow up and weight at admission and weight at 4th follow up. In the same way highly significant changes in MUAC was found between MUAC at admission and MUAC at 3rd follow up [Table 3].

Table 4: Correlation between weight & MUAC at admission & 4th follow up

Correlations (N=98)			
		Weight at admission	MUAC at admission
Weight at admission	Pearson Correlation	1	0.766**
	p-value		0.000
Weight at 4 th follow up	Pearson Correlation	1	0.727**
	p-value		0.000

** . Correlation is significant at the 0.01 level (2-tailed).

Table 4 showing correlation between weight at admission and MUAC at admission and weight at 4th follow up and MUAC at 4th follow up and perfect positive correlation was found between both pairs.

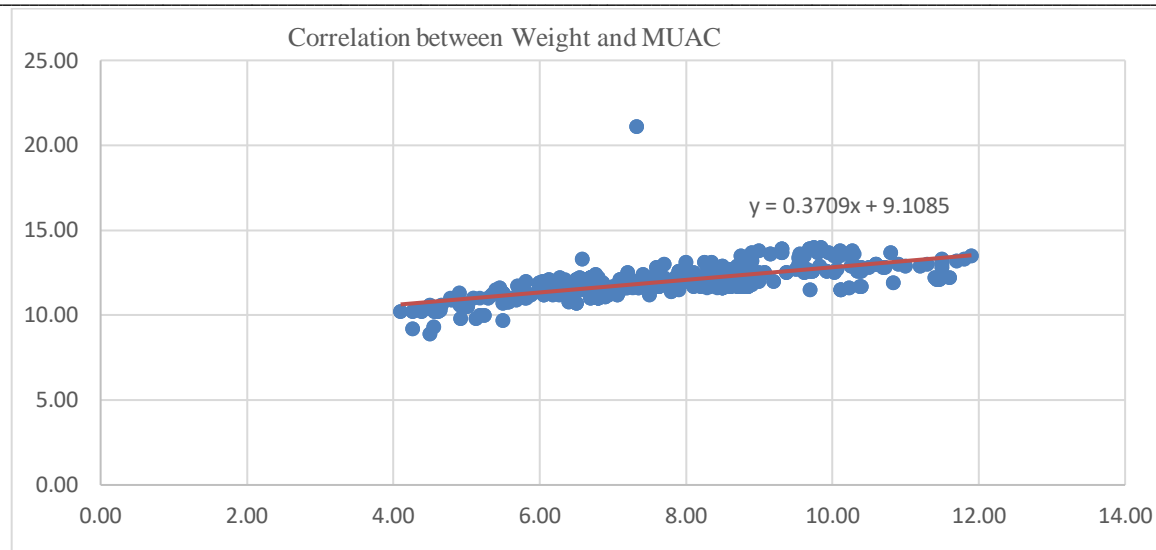


Fig 3: Correlation between weight & MUAC with equation

Figure 3 is showing positive correlation between weight & MUAC of SAM children as weight increases MUAC also tends to increase

Discussion

The study was planned to evaluate the impact of nutritional intervention provided at NRCs on anthropometric parameters (weight and MUAC). Main results of our study were – statistically significant change in weight & MUAC was noted. Most significant changes in weight were observed between weight at admission and weight at 3rd follow up and weight at admission and weight at 4th follow up similarly most significant change in MUAC was observed between MUAC at admission and MUAC at 3rd follow up of SAM perfect positive correlation was found between weight and MUAC of SAM children. Many studies were performed with the similar objectives.

Tandon et al[6] Concluded by their study that mean percentage weight gain was 11.6% the results are quite comparable to our study. Other study conducted by Rawat et al[7] also recorded recovery in SAM children in form of 15% weight gain in 66.3% SAM children. Pando M et al[8] reached to conclusion that there was significant improvement in weight & MUAC at end of study as compared to admission. Statistically significant changes in all anthropometric including weight & MUAC were observed by Gollamudi et al[9]. Sanghvi J et al[10] found that more than 50% of SAM children could not gained targeted weight at discharge unlike

current study but in this particular study they have only followed SAM children up to discharge while we followed SAM children up to 90 days. Abitew DB[11] et al also found recovery in less than 50% children unlike our study. Results of one study[12] (Khanna P. et al 2020) showed that the intervention was effective in community based management of severe malnutrition among children in rural northern India. Marko Kerac et al (2000)[13] conducted a study to evaluate the long term outcomes following programme discharge. They concluded that weight improved but height remained low. Taneja G et al (2012)[14] conducted a study to evaluate the effect of nutritional intervention on selected anthropometric indicators in 100 admitted children in NRC at Indore & Ujjain. They come with the conclusion that there was statistically significant difference between weight and MUAC, but they observed weight loss within 15 days of discharge from NRC. Another study (Das J.K. et al 2020)[15] concluded facility-based screening and management of uncomplicated SAM has no effect on recovery and mortality.

K.V. Radhakrishna et al (2010)[16] conducted a study to examine the composition of weight gain in 80 SAM children who underwent nutritional intervention in a hospital from India and they found that there was rapid weight gain with recovery of lost tissue in SAM

children. In present study also significant weight gain was noted (K Singh, N Badgaiyan, A Ranjan et al [17] assess the effectiveness of facility based care for children with SAM (1229) in NRC. They concluded weight gain was there but the desirable weight (target weight >15% of admission weight) was achieved by 46.85% SAM children. Teferi E, Lera M, Sita S, Bogale Z, Datiko DG, Yassin MA [18] conducted a study and concluded that the recovery rate was as 64.9% at 95% CI (61, 68). Death rate, default rate, weight gain, and length of stay were 1.2%, 2.2%, 4.2 g/kg/day, and 6.8 weeks respectively. The recovery rate and weight gain were lower than sphere standard. Behailu Derseh, Kalayu Mruts, Takele Demie et al [19] concluded that around 56% SAM children recovered. Mean weight gain for recovered children was 15.61 g/kg /day severely malnourished children though the rate of weight gain was moderate. D.Y. Gebremichael [20] concluded that nutritional recovery rate was 3.61 per 100 person day observations. Median nutritional recovery time was 22 and 29 days for oedematous malnourished and severely wasted children respectively. Colecraft EK, Marquis GS, Bartolucci AA et al [21] concluded that there were significant increases in children's weight-for-age ($P = 0.048$) and weight-for-height ($P = 0.002$) Z-scores between enrolment and discharge, most children discontinued programme participation before adequate recuperation like the present study. Lazzerini M, Rubert L, Pani P [22] conducted a study to evaluate the effectiveness of special food in treating moderate acute malnutrition concluded that lipid based nutrient supplements & specific types of blended foods improved weight gain, weight for height and MUAC. Hashmi G [23] et al came on the conclusion by their study that NRCs are effective in management of SAM. Burza S et al [24] Conducted a retrospective observational analysis & concluded achieved low mortality and high cure rates in nondefaulting children. Manjula M R [25] found low cure rate, high percentage of defaulters and non responders.

Conclusion

NRCs have emerged as an important & effective approach to address the SAM. As demonstrated by current study there was a significant improvement in weight and MUAC of SAM children after giving nutritional interventions at NRCs. However these results did not warrant us of complete recovery of SAM children. In order to avoid relapse and achieve complete

recovery some action is needed. In our study we recorded highly significant improvement in 3rd follow up in both weight & MUAC. If we can increase the duration of stay instead of 14-21 days (as per NRC protocol) may result in desirable sustainability in improvement.

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