



Paediatrics

A STUDY OF PRE ADMISSION AND DISCHARGE CLINICAL CONDITION IN CHILDREN ADMITTED IN NUTRITIONAL REHABILITATION CENTRE AND IMPACT OF HEALTH AND NUTRITIONAL EDUCATION ON THESE CHILDREN OBSERVED IN FOLLOW UP CLINICS

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ABSTRACT **Background:** Severe acute malnutrition (SAM) affects approximately 13 million children below 5 years of age and it causes death of 1- 2 million children every year. Nutritional rehabilitation centres (NRC) are established for restoring SAM children to good health while educating their mothers about nutrition and child care. After discharge from NRC only half of the patients could be traced. Follow up of these children at community level and also follow up at NRC units is essential to make sure the nutritional recovery achieved at the center is sustained even at home. **Aims And Objectives:** To evaluate nutritional intervention in improving the nutritional status, to check adherence to these measures and also to monitor their growth during follow up visits to NRC and to ascertain awareness and knowledge of mothers regarding feeding practices of NRC children. **Methods:** Prospective observational study was conducted among SAM children in NRC of a teaching hospital over a period of 18 months. 100 SAM children were enrolled. Details of Demography, Anthropometry and detailed History were taken. Physical examination and investigations were done. Children were managed as per WHO guidelines for malnutrition. Weight gain pattern was classified into 3 categories Poor (<5gm/kg/ day) / Moderate (5 to 10gms/ kg/ day) / Good (>10gms/kg/day). Children after discharge were followed up to monitor for continued improvement in weight gain. Mothers were assessed for their knowledge regarding correct feeding practices and necessary nutrition advice was given to be followed in the NRC and later at home for better weight gain in their children. **Results:** Majority of children were in the age group of <2yrs (77%). Male: Female ratio was 5.4:4.6. Breast feeding duration of <6 months was seen in 59%, Weaning was done early (<6 months) in 20%, duration of stay in NRC was <2 weeks in 77%. Most common presenting symptom was weight loss, most common sign pallor, and diarrhea and pneumonia were the most common complications. Severe wasting was noted in 85%, 61% had good weight gain. After 4 follow up visits, good weight gain was seen in 42%. 35% mothers were unaware of personal hygiene practices, 88% unaware of the preparation of complementary foods and 65% unaware of the therapeutic diet. Overall, 50% of the mothers knew how to prepare nourishing food using the ingredients that were readily available in their area. **Conclusions:** Linking SAM children and their mothers after discharge from NRC to ASHA workers is essential to ensure that the improvement in growth rates achieved in the center is sustained at home also.

KEYWORDS : Nutritional Rehabilitation Center, Severe acute malnutrition, weight gain patterns, follow up rates.

INTRODUCTION

Severe acute malnutrition (SAM) affects approximately 13 million children below 5 years of age and it causes death of 1- 2 million children every year due to various preventable causes. (1). According to the National survey (NFHS-5, 2019-21), 19% of the children below five years are wasted and about 6% of the children among them have severe wasting (<3SD). In most developing countries, mortality rate in hospitals treating SAM remain at 20-30% and very few of those requiring care actually have access to treatment (1). NRCs are established for restoring SAM children to good health while educating their mothers about nutrition and child care. After discharge from NRC only half of the patients could be traced. However the fate of the untraced majority is unknown. Vital information on the prognosis of children treated at the NRC unit is therefore lacking, follow up of these children at community level and also follow up at NRC units is essential to make sure the nutritional recovery achieved at the center is sustained even at home.

AIMS & OBJECTIVES

To evaluate effect of Nutritional intervention measures in improving the nutritional status during hospital stay and to check compliance of adherence to these measures and also to monitor their growth during follow up visits to NRC to ascertain awareness and knowledge amongst mothers of admitted children regarding practices followed at NRC's during their stay at centres with respect to diet and growth.

METHODS

Prospective observational study was conducted among children with SAM admitted in NRC, Department of Pediatrics, GGH, Kakinada over a period of 18 months from June 2021 to November 2022.

Inclusion Criteria:

Children who met WHO criteria for SAM and Mothers of children who were admitted in NRC.

Exclusion Criteria:

Children with any organic causes for severe malnutrition such as Cerebral palsy, Congenital heart disease, Hemolytic anemia, Malignancies, Chronic renal failure, Chronic liver disease, Other causes of edema such as nephritic syndrome were excluded. 100 consecutive SAM children admitted in NRC were enrolled in the study. Demographic characters of these children like age, gender etc were noted down. Anthropometric measurements like Weight, height, MUAC were taken using standard technique. Detailed History was taken, physical examination was performed. Investigations like CBC, Electrolytes, Random blood sugar, etc. were done. Any Other Investigations like Chest x ray, Mantoux etc were done whenever required. All these enrolled children were monitored regularly and managed as per WHO guidelines for the management of malnutrition. Weight gain pattern was noted down and classified into 3 categories Poor (<5 gm/kg/day) / Moderate (5 to 10 gms / kg / day) / Good (>10 gms / kg / day). Children who satisfied WHO criteria were discharged from NRC and followed up regularly to monitor for continued improvement in weight gain and adherence to nutritional interventions advised during admission at NRC. Mothers of these enrolled children were assessed for their knowledge regarding personal hygiene, complimentary food preparation and feeding practices at admission to NRC. Necessary advice was given to them regarding correct feeding practices to be followed in the NRC and later at home after discharge from NRC.

Table-1 Shows Demographic Characters Of Study Population.

	Frequency(N)	Percentage(%)
AGE		
< 12 MONTHS	44	44
12-24 MONTHS	33	33
24-36 MONTHS	10	10
36-60 MONTHS	13	13

TOTAL	100	100
GENDER		
MALE	54	54
FEMALE	46	46
TOTAL	100	100
DURATION OF BREAST FEED		
< 3 MONTHS	4	4
3-6 MONTHS	55	55
6-12 MONTHS	16	16
1-2 YEARS	25	25
TOTAL	100	100
TIMING OF WEANING		
< 6 MONTHS	20	20
> 6 MONTHS	80	80
TOTAL	100	100
DURATION OF STAY		
< 14 DAYS	77	77
> 14 DAYS	23	23
TOTAL	100	100

Majority of children were in the age group of <2yrs (77%). MALE: FEMALE ratio was (54:46). Breast feeding duration of <6 months was seen in 59% children. Weaning was done early (<6 months) in 20% of children and at or after 6 months in the remaining 80%. Duration of stay in NRC was <2 weeks in 77% and >2 weeks in 23%.

Table 1: Demographic characters of study population

Table - 2 Shows Clinical Profile Of Study Population

	Frequency (N)	Percentage (%)
SYMPTOMS AT PRESENTATION		
Vomiting	18	18
Diarrhoea	21	21
Oedema	6	6
Fever	44	44
Dyspnoea	18	18
Weight Loss	69	69
APPETITE		
Normal	70	70
Poor	25	25
No Appetite	5	5
WEIGHT/ HEIGHT		
< 3 SD	85	85
2SD – 3 SD	15	15
EXAMINATION FINDINGS		
Hypothermia	81	81
Pallor	96	96
Pedal Oedema	6	6
Oral Ulcer	12	12
Glossitis	9	9
Bitot Spots	1	1
Thin Hair	5	5
Skin Changes	2	2
WEIGHT GAIN		
Poor	10	10
Moderate	29	29
Good	61	61

In the present study, most common presenting symptom was weight loss(69%) followed by fever (44%). Other symptoms were vomiting (18%), diarrhea(21%), dyspnoea(18%). 70%children had good appetite, 25% poor appetite , 5% had no appetite. Severe wasting was noted in 85% and moderate in 15%. Most common finding on examination was pallor observed in 96%, other findings included were oedema 6%, glossitis 9%, oral ulcer 12%. 61% had good weight gain. Moderate weight gain observed in 29% and poor weight gain in 10%children.

All enrolled children were advised to come for follow up visits regularly to monitor weight gain patterns at 1 wk, 2 wk, 3 wk and 4 wk after discharge from NRC. Out of 4 follow up visits: 100% follow up noted in 1st visit, 99% in 2nd visit, 97% in 3rd visit, 90% in 4th visit. During these visits good weight gain was seen in 58%, 56%, 53% and 42% in the 1st, 2nd, 3rd and 4th visit respectively. Moderate weight gain was seen in 32%,35%,36% and 40% . Poor weight gain was noticed in 10% in 1st visit, 8% in rest of visits.

Table 3: Weight Gain Patterns During Follow Up Visits

	Frequency (N)	Percentage (%)
FOLLOW UP -1		
Good	58	58
Moderate	32	32
Poor	10	10
Total	100	100
FOLLOWUP -2		
Good	56	56.5
Moderate	35	35.4
Poor	8	8.1
Total	99	100
FOLLOWUP -3		
Good	53	54.6
Moderate	36	37.1
Poor	8	8.2
Total	97	100
FOLLOWUP -4		
Good	42	47
Moderate	40	44
Poor	8	9
Total	90	100

TABLE - 4 shows correlation between age of study population and weight gain patterns at time of discharge. When growth rate was correlated with age of children 15% out of 100 children had poor growth rate during hospital stay. Among the different age groups poor weight gain was seen in 21% of children in the age group of 12-24 months of age and it was less in children of < 1 yr and 2-3 yr age group. There was statistically significant difference observed between age of children and growth rate during hospital stay with p value of <0.02.

Table 4: Correlation Between Age Of Study Population And Weight Gain Patterns At Time Of Discharge

Age in months	Growth at Discharge			Total	Chi square
	Good	Moderate	Poor		
<12 Months	26 (59.1%)	13 (29.5%)	5 (11.4%)	44 (100%)	Df-6
12-24 Months	9 (27.3%)	17 (51.5%)	7 (21.2%)	33 (100%)	
24-36 Months	1 (10%)	8 (80.0%)	1 (10%)	10 (100%)	
36-60 Months	4 (30.8%)	7 (53.8%)	2 (15.4%)	13 (100%)	
Total	40 (40%)	45 (45%)	15 (15%)	100(100%)	P value 0.021

TABLE - 5 shows medical complications in study population

Among 100 children enrolled, 19% had diarrhoea, 16% pneumonia , 1% had both , other medical complications like seizures, vomitings ,severe anemia etc. were noticed in 64% children

Table 5: Medical Complications In Study Population

	Frequency (N)	Percentage (%)
DIARRHOEA	19	19
PNEUMONIA	16	16
DIARRHOEA+PNEUMONIA	1	1
OTHERMEDICALCOMPLICATIONS	64	64
TOTAL	100	100

TABLE - 6 shows association between presenting complaints of study population and weight gain patterns

Association between presenting complaints and the growth rate showed that only vomitings and weight loss had statistically significant association with growth rate with p value of <0.001

Table 6: Association Between Presenting Complaints Of Study Population And Weight Gain Patterns

Relation with the complaints at the time of discharge					
Complaints	N	Good	Moderate	Poor	P Value
Appetite (poor)	25	11(44%)	11(44%)	3(12%)	0.754
Vomiting	18	15 (83.3%)	2 (11.1%)	1 (5.6%)	<0.001**
Diarrhoea	21	8(38.1%)	11 (52.4%)	2 (9.5%)	0.645
Oedema	6	3 (50%)	2 (33.3%)	1 (16.7%)	0.833
Fever	44	14(31.8%)	21(47.7%)	9 (20.5%)	0.223
Dyspnoea	18	4 (22.2%)	10 (55.6%)	4 (22.2%)	0.358
Weight loss	69	33 (47.8%)	29 (42%)	7 (10.1%)	0.025

DISCUSSION

Severe acute malnutrition increases the risk of death in under 5 children. Therefore its identification and management plays a vital role in reducing the under-five mortality rates. The present study was done to assess the efficacy of the feeding guidelines given by WHO in achieving improvement in growth rates of SAM children and also to find out the feasibility of implementation of these guidelines in our hospital setting. This study also assessed awareness and knowledge amongst mothers of admitted children regarding feeding practices.

Out of 100 SAM children in the present study, 10% had a poor outcome (<5g/kg/day), 29% had moderate outcome (5 to 10g/kg/day), 61% had good outcome (10 to 15 g/kg/day) whereas in Md Iqbal Hossain et al. Study, 14.7% of the children had poor outcome, 30.9% moderate outcome and 54.4% good outcome.

The age group affected most commonly in the present study (6-11 months) was similar to the study conducted by K Singh et al (6-23months), but different with respect to the study conducted by Taneja et al (13-36 months).

16 were low birth weight in this age group and failed to have catch up growth. The other causes for high Incidence of SAM in this age group were unhygienic feeding practices, too early and too late initiation of complimentary feeds and inadequate food intake. So there is strong need to educate the parents, especially mothers on IYCF practices during antenatal and postnatal visits and also at every visit for immunization. The key IYCF practices (24) for optimum growth and development of under 5 children are : Early initiation of breastfeeding, Exclusive breastfeeding, continued breastfeeding, Introduction of complimentary foods, Minimum dietary diversity, Minimum meal frequency, consumption of iron rich or iron fortified food. The mean duration of stay in present study was 13.59 ± 5.67 days, which is much less than earlier programs for children with SAM conducted in Latin America, in which the average length of hospital stay ranged from 6 weeks to 8 months (25-27) but average duration of stay in the present study was slightly higher when compared to studies done by Manish Maurya et al (12.7 days), K Singh et al (13.2days) and Taneja et al (13.4 days). The most important factor in lowering death among severely malnourished children is an improvement in weight. Therefore, weight increase is considered the primary anthropometric indicator of recovery. In present study, the average weight gain was 23.98 gm. During a child's stay at one of the four residential therapy centers, an average weight gain of atleast 8 grams per kilogram per day was seemed sufficient (28). In a study at four-day care NRCs, Cole craft et al also noted a substantial rise in weight forage for the admitted kids (29). The average weight gain per day reported by Savadago et al was comparable to weight gain shown in the current study, which was 10.18 ± 7.05 g/kg/day (30). Results from studies comparing inpatient, day care, and home-based care for severely malnourished children in Bangladesh showed that the inpatient group experienced an average weight increase of 11g/kg/day (31-33). In the present study 96% were having Pallor and 81% had Hypothermia. Other signs included oral ulcers in 12%, glossitis in 9%, pedal edema in 6%, thin hair in 5%, skin changes in 2% and bitot spots in one child . In Shruthi Purushotham et al study, 95% were having pallor, hypothermia in 85%, glossitis in 10%, pedal edema in 8% of children. None of these parameters had any statistically significant association with the outcome ie weight gain in

the study population. In the present study, 21% children had diarrhoea, 18% children had vomiting, 18% had dyspnoea and 69% presented with weight loss. When p value was calculated for the association between these parameters and outcome, statistical significance was observed only with vomiting.

Dropout rate of 3.5% was noted in follow up in the present study. Dropout was reported by Savadago et al as 8.5% (36), by Taneja et al as 9.89% and by Manish Maurya et al as 4.4%. Follow up rate is low after two visits in spite of communication by NRC staff in the form of phone calls . Majority of them were coming to follow up only when children had some ailments but not for regular checkup. Causes for loss of follow-up, when enquired by telephone were well child and loss of daily wages. In the present study, daily wages cheque was given at 6 weeks follow up to ensure atleast three follow ups. The present study findings (1%, 3%, 19% drop outs) revealed increasing dropout rates with each successive follow-up that was comparable to the research conducted by Taneja et al (5.89%, 10%, 15%, and 23%).

Creating a network of outreach workers from the NRCs or choosing volunteers in accordance with the Revised National Tuberculosis Control Program (DOTS provider) from various localities who may keep track of the discharged children's follow-up dates and assist the ASHAs is useful in reducing the dropout rate.

In the present study, around 35% of the mothers of the hospitalized children were unaware of personal hygiene practices, 88% of were unaware of the preparation of complementary foods and 65% were unaware of the therapeutic diet. Overall, 50% of the mothers knew how to prepare nourishing food using the ingredients that were readily available in their area, and 50% did not. Even while the majority of mothers had the right information on the intervals between meals at the NRCs, only 5% and 1% of mothers respectively knew the right ingredients and preparation methods for the F-75 and F-100 diets. The lactose-free meals were unknown to any of the mothers. The women using the facility had little understanding of the fundamentals of nutrition and various government health initiatives focusing on nutrition. In order to effectively care for the children, mothers are expressly retained at the center and are taught the preparation of the therapeutic diets from locally available material. Surprisingly, this fact is frequently overlooked in many centers, which instead focus heavily on the children's improved nutritional status, which is fundamentally seen as the program's success criterion. Involving fathers and other family caregivers in the program is necessary since, in many cases, mothers in our society do not have the authority to determine what the family should eat. The quantity of money paid to the mothers throughout their stay at the center is a significant topic of concern. The present amount of Rs.100 per day is much less as compared with the minimum daily wage presently paid through the labor schemes of the Government of India. The mothers of the admitted children brought up a number of significant issues, including the compensation amount offered to the mothers for the daily salary loss and the lack of food provided to the accompanying children. These factors may have a negative impact on mothers' cooperation at the centers. Steps should be taken to provide meals separately for the mothers and accompanying children, and this money should not be taken out of the daily pay loss compensation.

Limitations Of Present Study

1. Relatively smaller sample size
2. Mothers were involved in the care of the children including the preparation of the feeds. Hence uniformity in the dietary practices could not be maintained.

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