

## Research Article

# A study to evaluate the effects of nutritional intervention measures on children admitted in the nutritional rehabilitation center (Bal Sanjeevani Kendra) of Surendranagar district

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### ABSTRACT

**Background:** The life cycle dynamics of the causes and consequences of malnutrition demand a holistic and all inclusive approach to prevent and treat under-nutrition and nutritional deficiencies. In response, Government of Gujarat launched “Mission Balam Sukham” in the year 2012 which focuses on both preventive and curative aspects. Curative aspect consist of three tier approach for integrated management of malnutrition at three different levels. Nutritional rehabilitation Center is a unit in a district health facility where children with severe acute malnutrition are admitted and provided with the nutritional & therapeutic care.

**Methods:** Analysis of data of all the children admitted to Nutritional Rehabilitation Centre of Surendranagar district from June-2012 to November 2013. Statistical analysis was done using SPSS.

**Results:** A total of 280 children were included in the study. The overall mean weight at admission was found 8.30 kg with standard deviation of 2.09 kg and the mean weight at the time of discharge was 8.97 kg with standard deviation of 2.16 kg. Average weight gain among 141 boys was 6.63 g/kg/day and among girls was found 7.60 g/kg/day. Out of total 280 children, 103 (36.79%) children had weight gain as per the standard criteria (8 gm/kg/day). Diarrhoea was found to be the associated medical condition in majority of the children. Out of total 184 children without medical complications, 97 (52.72%) children had weight gain as per the standard criteria.

**Conclusions:** Present study reflected that Nutritional Rehabilitation Centers have been playing a key role to cope with malnutrition as demonstrated by high weight gain rate as well as high recovery rate.

**Keywords:** Malnutrition, Nutritional Rehabilitation Center, Nutritional Intervention

### INTRODUCTION

Malnutrition, as a major public health and nutrition challenge faced by many developing countries, stands as a consequence of several key social and economic factors. The life cycle dynamics of the causes and consequences of malnutrition demand a holistic and all inclusive approach to prevent and treat under-nutrition and nutritional deficiencies. Inappropriate feeding practices is still believed to account for at least one-third of causes of malnutrition, and contributes significantly to morbidity and mortality, among children under five.<sup>1</sup> It is estimated that improved feeding habits aimed to prevent

or treat malnutrition could prevent 11 million child deaths globally per year.<sup>2</sup> Thus, efforts to address this issue are of paramount importance and have political, economic and cultural implications across all levels of societies for many developing nations. India holds the dubious distinction of being the birth place of a third of the world’s entire population of malnourished children.

In response, Government of Gujarat launched “Mission Balam Sukham” in the year 2012 which focuses on both preventive and curative aspects. Curative aspects consist of three tier approach for integrated management of malnutrition at three different levels.<sup>3</sup> Nutritional

Rehabilitation Center is a unit in a district health facility where children with Severe Acute Malnutrition (SAM) with significant medical needs are enrolled residentially as per the defined admission criteria and provided with medical and nutritional therapeutic care. In addition to curative care special focus is given on timely, adequate and appropriate feeding for children; and on improving the skills of mothers and care givers on complete age appropriate caring and feeding practices. In addition, efforts are made to build the capacity of mothers/care givers through counseling and support to identify the nutrition and health problems in their child.<sup>4</sup>

**METHODS**

It was analysis of the data available from the records of the children admitted to Nutritional Rehabilitation Center of Surendranagar district from June 2012 to November 2013. Data on weight status at admission and discharge, rate of weight gain, length of stay, results of appetite test, grade of malnutrition at entry and exit, weight status at follow up visits and associated medical complications were analysed from the records. Statistical tests such as t-test and  $\chi^2$  test were applied wherever needed using SPSS.

**RESULTS**

A total of 284 children were admitted to NRC from June-2012 to November 2013. There were 3(1.07%) defaulters and 1child (0.36%) was referred from NRC to higher center. So, a total of 280 children were included in the study.141 (50.36%) were boys and 139 (49.64) were girls.

Out of total 280 children, 81 (28.92%) were between 13-24 months, 59 (21.07%) between 25-36 months, 58 (20.71%) between 49-60 months, 47 (16.79%) between 37-48 months, 33 (11.79%) were in the age group of 7-12 months and only 2 (0.71%) were below 6 months of age (Table 1).

**Table 1: Age wise distribution of the admitted children (N=280).**

Age Groups (Months)	Number	Percentage (%)
0-6	2	0.71%
7-12	33	11.79%
13-24	81	28.92%
25-36	59	21.07%
37-48	47	16.79%
49-60	58	20.71%
Total	280	100%

Table 2 shows mean weight of 280 children at the time of admission and discharge. The overall mean weight at admission was found 8.30 kg with standard deviation of 2.09 kg and the mean weight at the time of discharge was 8.97 kg with standard deviation of 2.16 kg. A statistically significant difference was observed for weight at

discharge and weight at admission for the study group ( $t=11.286, p<0.001$ ) (Table 2).

**Table 2: Mean weight at admission and discharge (N=280).**

Age Groups (Months)	Mean Weight (Admission)	Mean Weight (Discharge)
0-6	3.26 ± 0.17	3.89 ± 0.13
7-12	5.90 ± 0.85	6.55 ± 0.86
13-24	6.79 ± 0.94	7.40 ± 0.89
25-36	8.08 ± 0.98	8.63 ± 0.93
37-48	9.84 ± 0.66	10.41 ± 0.64
49-60	10.93 ± 1.40	11.87 ± 1.36
Overall	8.30 ± 2.09	8.97 ± 2.16

( $t=11.286, p<0.001$ )

The analysed data revealed that the overall mean weight of 141 boys at the time of admission was 8.41 kg with standard deviation of 2.03 kg and at the time of discharge it was 9.07 kg with standard deviation of 2.09 kg. The difference of weight at the time of admission and discharge was found to be statistically significant ( $t=13.235, p<0.001$ ) (Table 3).

**Table 3: Mean weight at admission and discharge for boys (N=141).**

Age Groups (Months)	Mean Weight (Admission)	Mean Weight (Discharge)
0-6	3.14	3.80
7-12	6.28 ± 0.41	6.91 ± 0.40
13-24	6.92 ± 0.97	7.53 ± 0.96
25-36	8.23 ± 1.04	8.83 ± 0.97
37-48	10.07 ± 0.61	10.63 ± 0.64
49-60	11.10 ± 0.95	12.0 ± 0.87
Overall	8.41 ± 2.03	9.07 ± 2.09

( $t=13.235, p<0.001$ )

It was observed that overall mean weight of 139 girls at the time of admission was 8.19 kg with standard deviation of 2.15 kg and at the time of discharge it was 8.86 kg with standard deviation of 2.22 kg. Observed difference was statistically significant ( $t=9.194, p<0.001$ ) (Table 4).

**Table 4: Mean weight at admission and discharge for girls (N=139).**

Age groups (months)	Mean weight (admission)	Mean weight (discharge)
0-6	3.39	3.99
7-12	5.44 ± 1.00	6.11 ± 1.06
13-24	6.64 ± 0.90	7.26 ± 0.78
25-36	7.96 ± 0.94	8.46 ± 0.87
37-48	9.63 ± 0.65	10.20 ± 0.66
49-60	10.76 ± 1.72	11.76 ± 1.70
Overall	8.19 ± 2.15	8.86 ± 2.22

( $t=9.194, p<0.001$ )

Overall average weight gain among 141 boys was 6.63 g/kg/day with standard deviation of 3.50 g/kg/day and the highest average weight gain was observed among 0-6 months of age group followed by 7-12 months of age group. Among 139 girls the overall average weight gain was found 7.60 g/kg/day with standard deviation of 4.22 g/kg/day and the highest weight gain was observed in 7-12 months of age group followed by 49-60 months of age group. No statistically significant difference was observed for weight gained among boys & girls ( $t=1.269$ ,  $p>0.05$ ) (Table 5).

**Table 5: Age wise distribution for the average weight gained (N=280).**

Age Groups (Months)	Boys (G/Kg/Day)	Girls (G/Kg/Day)
0-6	10.01	8.43
7-12	8.75 ± 3.88	11.17 ± 4.87
13-24	6.93 ± 3.34	7.54 ± 3.79
25-36	6.22 ± 3.27	5.96 ± 4.20
37-48	4.12 ± 2.05	5.39 ± 2.59
49-60	7.04 ± 3.63	9.44 ± 3.79
Overall	6.63 ± 3.50	7.60 ± 4.22

( $t=1.269$ ,  $p>0.05$ )

Out of 280 children 103 (36.79%) children had weight gain as per the standard criteria (8 gm/kg/day). Out of total 184 children without medical complications, 97 (52.72%) children had weight gain as per the standard criteria, where as among 96 children with medical complications only 6.25% children had weight gain as per the standard criteria (Table 6).

**Table 6: Average weight gain among admitted children (N= 280).**

Weight Gain (G/Kg/Day)	Children With Complications (N=96)	Children Without Complications (N=184)	Total
< 2	09 (69.23%)	04 (30.77%)	13 (100%)
2 – < 4	38 (73.08%)	14 (26.92%)	52 (100%)
4 – < 6	30 (43.48%)	39 (56.52%)	69 (100%)
6 – < 8	13 (30.23%)	30 (69.77%)	43 (100%)
≥ 8	6 (5.83%)	97 (94.17%)	103(100%)

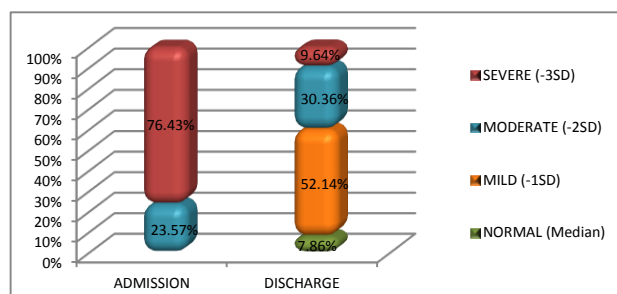
Analysis of the data shows that drop-out rate for the first follow-up visit was 22.5%, 25% for 2<sup>nd</sup> and 3<sup>rd</sup> follow-up visit and around 29% for the fourth follow-up visit. Out of total 198 children who had completed the fourth follow-up visit, around 84% children had gained weight while about 16% had lost weight compared to their previous weight status (Table 7).

On classifying the children at the time of admission according to their malnutrition grade it was found that 76.43% children were severely malnourished (W/H < -3SD) and 23.57% children were moderately

malnourished (W/H < -2SD), where at the time of discharge 7.85% children became normal, 52.14% children were having mild malnutrition (W/H < -1SD), 30.36% children were moderately malnourished (W/H < -2SD) and only 9.64% children were severely malnourished (Figure 1).<sup>5-7</sup>

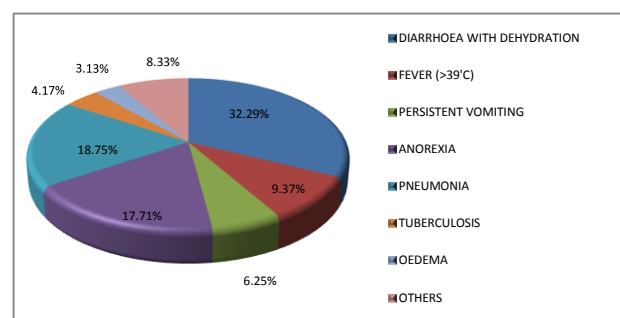
**Table 7: Proportion of children with weight gain and weight loss at each follow up visits (N=280).**

Follow-Up Visits	Dropout Rates	Weight Gained	Weight Lost	No Change in Weight
1st Follow-Up (N=217)	22.5%	155 (71.42%)	59 (27.19%)	3 (1.38%)
2nd Follow-Up (N=210)	25%	159 (75.71%)	49 (23.34%)	2 (0.95%)
3rd Follow Up (N=210)	25%	163 (77.62%)	35 (16.67%)	12 (5.71%)
4th Follow-Up (N=198)	29.28%	166 (83.84%)	31 (15.66%)	1 (0.50%)



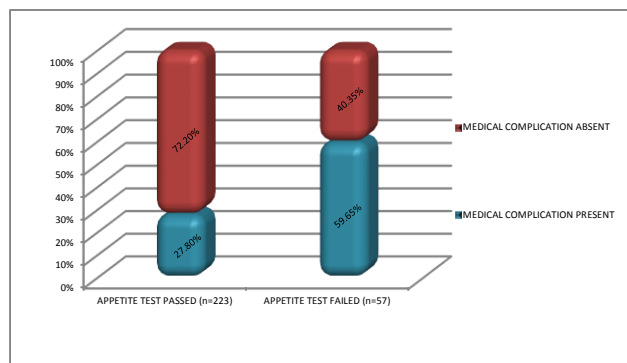
**Figure 1: Category of malnutrition at admission and discharge (n=280).**

When the children were assessed at the time of admission for the associated medical conditions, it was found that majority (32.29%) were suffering from diarrhoea with dehydration, 18.75% had oedema, 17.71% were having anaemia, 9.37% were having high grade fever, 6.25% had persistent vomiting, 4.17% were suffering from tuberculosis and 3.13% had pneumonia (Figure 2).<sup>8</sup>



**Figure 2: Associated medical complications (n=96).**

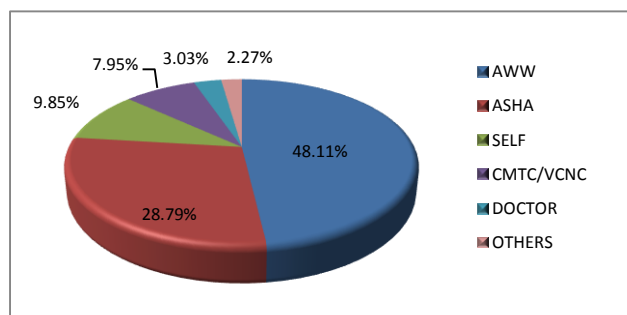
Analyzed data revealed that out of 280 children 79.64% (223) children passed the appetite test, where as 20.36% (57) children were failed in the test. Among 57 children who had failed the appetite test majority (59.65%) had medical complications, where as among 223 children who had passed the appetite test only 27.80% children had medical complications. The difference had a significant statistical association.<sup>9</sup> ( $\chi^2= 20.435$ ,  $p<0.001$ ) (Figure 3).



( $\chi^2 = 20.435$ ,  $p<0.001$ )

**Figure 3: Relation of appetite test and medical complications (n=280).**

A vast majority of the respondents (48.11%) were referred to Nutritional Rehabilitation Center by Anganwadi Worker (AWW), about 29% were referred by ASHA worker, 9.85% were self reported, 7.95% children were referred from Child Malnutrition Treatment Center (CMTC) / Village Child Nutrition Center (VCNC) and only 3.03% were referred by doctors. (Figure 4).



(\*\* Data of 16 children was missing.)

**Figure 4: Sources of referral. (n=264)\*\***

## DISCUSSION

The present study was undertaken with the following objectives: 1) To assess the effects of nutritional intervention measures on the malnourished children admitted to Nutritional Rehabilitation Center. 2) To find out associated co-morbid conditions among these children and their health status at follow up visits.

As per the guideline recovery rate should be more than 50%. In present study recovery rate among non

complicated cases is more than 50%, however recovery rate among complicated cases does not match the criteria. Diarrhoea with dehydration was found to be the frequent associated medical complication among children at the time of admission. Regarding death rate, not a single death is reported at NRC during the study period. Defaulter rate as per the study is 1.84%, which is within the acceptable limits (<15%) as per the guideline. As per the study result, mean weight gain for the entire study group was  $7.13 \pm 3.91$  g/kg/day. An average weight gain of 8 g/kg/day is adequate for the child during the stay. As per the guidelines, length of the stay should be at least one week and in the study around 98% of the study participants had fulfilled the criteria.<sup>4</sup>

Present study reflected that Nutritional Rehabilitation Center has been playing a key role to cope with malnutrition as demonstrated by massive reduction in the proportion of severely malnourished children. In-patient program had shown good success in rehabilitating severely malnourished children. However, evaluation had pointed out the weakness at follow up visits. The study showed that grass root level link workers like ASHA/ AWW were responsible for most of the referral, hence it clearly emphasizes the need to mobilize and motivate these staff for better delivery of services and information. It could be worthwhile to establish mobile Nutritional Rehabilitation center (NRC) that could reach missed out cases and to set a follow up system at home for rehabilitated children effectively as well as to propose promotion and prevention rather than curative action in the health sector.

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*Conflict of interest: None declared*

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

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