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WEIGHT GAIN ON WHO RECOMMENDED F-100 DIET IN CHILDREN UNDER FIVE YEARS OF AGE HOSPITALISED WITH SEVERE ACUTE MALNUTRITION AT KHAIRPUR MEDICAL COLLEGE HOSPITAL

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ABSTRACT

Background:

Severe acute malnutrition (SAM) is a major contributor to under-five child mortality worldwide. WHO recommends that children with SAM be managed in hospitals with F75 during stabilization and F100 during rehabilitation.

Objective:

To determine the frequency of children under five years of age hospitalized with severe acute malnutrition having adequate weight gain on F100 diet during the rehabilitation phase at KMC Hospital.

Methods:

Parameter	Description
Study Design	Descriptive study
Setting	Department of Pediatrics Medicine, KMC Hospital Khairpur Mirs
Duration	6 months
Sampling Technique	Non-probability consecutive sampling
Sample Size	110 children
Inclusion Criteria	Children aged 6 months – 5 years with severe acute malnutrition (SAM)
Management Protocol	Stabilization with F75 diet, followed by rehabilitation with F100 diet
Measurements	Initial weight (W1) and final weight (W2) recorded
Formula for Average Daily Weight Gain	Average daily weight gain=(W2−W1)×1000W1×D\text{Average daily weight gain} = \frac{(W2 - W1) \times 1000}{W1 \times D} where W1 = weight at start (kg), W2 = weight at discharge (kg), D = duration of hospital stay (days)
Criteria for Adequate Weight Gain	> 10 g/kg/day
Data Analysis Software	SPSS version 25
Statistical Methods	Frequencies, percentages, means, chi-square test
Significance Level	p-value < 0.05 considered statistically significant

Results:

Mean weight at admission was 4.82 ± 1.70 kg. Average daily weight gain was 14.10 ± 5.23 g/kg/day (range: 5.34–28.35 g/kg/day), which was significantly greater than weight at admission (p=0.000). Adequate weight gain was achieved in 36 (81.8%) cases, while 8 (18.2%) showed inadequate gain. Mean duration of hospital stay was 12.91 ± 6.85 days.

Conclusion:

Majority of children with SAM on F100 diet achieved adequate weight gain during rehabilitation. Weight gain was significantly associated with weight at admission. F100 formula remains an effective intervention for nutritional rehabilitation.

INTRODUCTION

Severe acute malnutrition (SAM) can be defined as "low weight for height or mid-upper arm circumference with respect to countries." Malnutrition is the root cause of 45% of under-five child mortality worldwide. Malnourished children are at increased risk of mortality, morbidity, and both communicable and non-communicable diseases. The first five years of life are the most important for development. In Pakistan, children under five years comprise about 9.4% of the total global population. Protein energy malnutrition is a common disease in Pakistani children. To reduce mortality, WHO recommends that children with SAM be managed in hospitals.

Severe acute malnutrition is identified by severe wasting (<70% Weight-for-height median or <-3SD Weight-for-height z-score). Management occurs in two phases: an initial stabilization phase and a longer rehabilitation phase. In stabilization, acute conditions are managed, deficiencies corrected, metabolic abnormalities reversed, and feeding started with F75 (75 kcal/100 ml, 0.9 g protein/100 ml). In rehabilitation, children are shifted to F100 (100 kcal/100 ml, 2.9 g protein/100 ml), with recommended weight gain >10 g/kg/day. This phase usually lasts 3–4 weeks.

Global studies, including those in Ethiopia and Senegal, have shown significant weight gain in SAM children on F100. Weight gain ranged from 6.3 g/kg/day to 14 g/kg/day, with recovery rates between 61%–87%. Previous studies also reported variable hospital stay durations (12–43 days).

Rationale of Study

The rationale is to determine the frequency of severely malnourished children under five years of age on F100 diet during rehabilitation at the Nutrition Stabilization Center, KMC Hospital, to reduce mortality. This study also aims to assess weight gain in children on F100 so parents can be counseled to use this diet and prevent recurrence of SAM.

Objective of Study

To determine the frequency of children under five years hospitalized with severe acute malnutrition having adequate weight gain on F100 diet.

Operational Definitions

Severe Acute Malnutrition (SAM): Presence of bilateral pedal edema and severe wasting (weight-for-height/length <-3SD or MUAC <115 mm).

Marasmus: Severe form of protein-energy malnutrition due to calorie insufficiency, causing stunted growth and muscle wasting.

Kwashiorkor: Severe protein malnutrition with bilateral edema, ascites, hair changes, and skin lesions.

MUAC (Mid-upper Arm Circumference): Anthropometric indicator for SAM diagnosis (<23.5 cm suggests BMI <20 kg/m²).

Materials and Methods

Study Setting: Department of Pediatrics Medicine, KMC Hospital, Khairpur Mirs.

Study Design: Descriptive study.

Duration: Six months after approval.

Sample Size: 110, calculated using prevalence (8.23%), 95% CI, 5% margin of error, and population size of 20,000.

Sampling Technique: Non-probability consecutive sampling.

Inclusion Criteria

Age 6 months–5 years
Clinical features of SAM

Exclusion Criteria

Age <6 months or >5 years
Persistent vomiting
Acute diseases (severe pneumonia, diarrhea)
Congenital malformations (e.g., cleft lip/palate, cerebral palsy)

Data Collection Procedure

This study will be conducted at department of Pediatrics at KMC teaching Hospital units. After getting consent from ethical committee of the institution and CPSP approval and getting consent from patient's attendants, the study will be started. Questionnaire will be formulated. The patients will be

taken from Pediatrics OPD and emergency department of Khairpur Medical College Hospital. Socio-demographics features like age, body weight, residence and others will be recorded. Malnutrition and its type will be assessed.

Patients of severe acute malnutrition having weight for height/length less than -3 SD (Less than 70% of expected) will be admitted in hospital nutritional rehabilitation unit. In stabilization phase, life-threatening problems will be identified and treated, metabolic abnormalities will be reversed and feeding will begin with F75 diet according to guidelines set by World Health Organization (WHO), the duration of stabilization phase is at least seven days. Patients in rehabilitation phase on F100 formula will be included in study. F-100 is the "catchup formula that rebuild wasted tissues in SAM children; F-100 contains 100 kcal and 2.9 g protein per 100ml" Duration of rehabilitation phase is usually two to six weeks. Initial weight (W1) was measured as soon as the child was admitted and final weight (W2) was measured on 7 days of rehabilitation phase about one hour after a feed after standardizing the scale. Average daily weight gain will be calculated as follows:

$$\text{Average daily weight gain} = \frac{(W_2 W_1) \times 1000}{Wt \times D}$$

W1 = weight at start of F100 diet (kg);
W2 = weight at discharge while on F100 diet (kg)
D= duration of hospital stay while on F100

Daily weight gain of >10gm/kg/day will be taken as adequate Patients name, age, weight, height/length, weight for height/length, registration number, serial number, daily average weight gain will be entered in a pre-designed proforma. The outcome variable that is adequate weight gain will be noted in the order of frequency.

Data Analysis

Data were analyzed in SPSS v25. Frequencies and percentages were used for categorical variables; means ± SD for numerical variables. Chi-square was applied to control confounders. A p-value <0.05 was considered significant.

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Results

Table 1: Baseline Characteristics of Study Participants (n = 110)

Variable	Mean ± SD / n (%)
Mean weight at admission (kg)	4.82 ± 1.70
Mean duration of hospital stay (days)	12.91 ± 6.85
Sex distribution	Not specified in dataset (but study noted more girls malnourished)

Mean admission weight: 4.82 ± 1.70 kg
Mean hospital stay: 12.91 ± 6.85 days

Table 2: Weight Gain Outcomes

Outcome	Value
Average daily weight gain (g/kg/day)	14.10 ± 5.23
Minimum weight gain (g/kg/day)	5.34
Maximum weight gain (g/kg/day)	28.35
Adequate weight gain (>10 g/kg/day)	36 (81.8%)
Inadequate weight gain (≤10 g/kg/day)	8 (18.2%)

Average weight gain: 14.10 ± 5.23 g/kg/day (min 5.34, max 28.35)
Adequate weight gain: 81.8% (36 cases)

Inadequate weight gain: 18.2% (8 cases)

Table 3: Association Between Weight Gain and Admission Weight

Variable	Association (p-value)
Weight at admission vs. weight gain	p = 0.005 (significant)

Weight gain significantly associated with admission weight (p=0.005)

Table 4: Comparison of Study Findings with Previous Research

Study	Mean Weight Gain (g/kg/day)	Adequate Recovery (%)	Mean Duration of Hospital Stay (days)
Current Study (KMC Hospital, Pakistan)	14.10 ± 5.23 (Range: 5.34–28.35)	81.8%	12.91 ± 6.85
Diop et al	10.1 (on F100 diet)	Not specified	17.3
Yebyo et al	6.30 (on F100 diet)	61.78%	43.68
Teferi et al	13.4 (on F100 diet)	87%	21

Comparisons with previous studies showed similar or slightly higher weight gain compared to Diop et al (10.1 g/kg/day), Yebyo et al (6.3 g/kg/day), and Teferi et al (13.4 g/kg/day).

Discussion

This study found that most children with SAM on F100 achieved adequate weight gain (>10 g/kg/day). Mean weight gain (14.1 g/kg/day) aligns with international studies, showing F100 as effective for nutritional rehabilitation. Duration of stay (12.9 days) was shorter than reported by Yebyo et al (43.6 days) and Teferi et al (21 days), indicating effective hospital management.

Weight gain was significantly associated with admission weight, consistent with previous findings. Girls had higher malnourishment rates, in line with earlier reports.

Conclusion

F100 diet during the rehabilitation phase results in adequate weight gain in the majority of children with SAM. Early hospital management and nutritional rehabilitation are critical to reducing mortality and morbidity in malnourished children.

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