ORIGINAL RESEARCH PAPER

Paediatric Medicine

NUTRITIONAL INTERVENTION IN SEVERELY MALNOURISHED UNDER 6 MONTHS INFANTS.

KEY WORDS: Feeding Pattern, Malnourished Infants, Breast-feeding, Nutritional Treatment

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ABSTRACT

Severe acute malnutrition is associated with mortality in young infants. Associated risk factors and management were not well addressed. **Objectives:** The aims of this study were to analyse the different nutritional intervention in severe acute malnutrition in children < 6 months of age. **Methods:** This cross-sectional observational study was conducted between August 2022 to January 2024 wherein the average duration of stay, discharge outcomes and average eight gain was compared amongst those given only direct breast feed and those given therapeutic milk with or without breastmilk. Infants' demographic, clinical and anthropometric measurements were recorded and then received routine medications and nutritional support. **Results:** A total of 242 infants were recruited for the study. a majority of the children, are between 1-3 (68.2%) months old, while the remaining are aged 4-6 months (31.8%). The study population consisted of 59.5% males, most children (89.3%) were born at term, 40.9% of the children were Sick New-born Care Unit (SNCU) graduates, majority of 44.2% stayed for 2 weeks and Pneumonia was the most common diagnosis, affecting 27.6% of the children (67 cases). . The majority of the children,65 % (159 out of 242), achieved full recovery during the study period and 14.9% (36 children) only had Partial Recovery. **Conclusion** : Severe malnutrition in U6M infants is a major contributor to under-5 mortality. It is important to ensure adequate nutrition in these babies to prevent short term and long-term adverse outcomes. The management of malnourished under 6 months infants, involving comprehensive inpatient care and outpatient follow up for mother- infant dyads, appears to result in stabilisation and recovery rates that align with acceptable standards. Although, exclusive breast feeding remains the corner stone of the management, in those with no prospects of breast-feeding or maternal milk insufficiency dilute F-100 is an effective and safe alternative when breast feeding support followed by SST remains unsuccessful. Dilute F-100 can be used as safer alternative in case of maternal milk insufficiency or no prospects of breast feeding.

INTRODUCTION

The first 1000 days of life are crucial for the development of the brain. The nervous system develops during the first six months of life, a time of fast growth and development. [1] To guarantee development and growth, it is crucial to make sure the infant receives enough nourishment during this time. [2] Despite decades of nutritional initiatives, malnutrition accounted for about 706,000 of the 1.04 million children under five who died in India in 2017[3].

The level of evidence is clearly characterized as "very low quality," mainly due to the paucity of studies on WHO recommendations for children under six months how to evaluate diagnostic criteria and therapeutic options for feeding specifically in this age group [4]

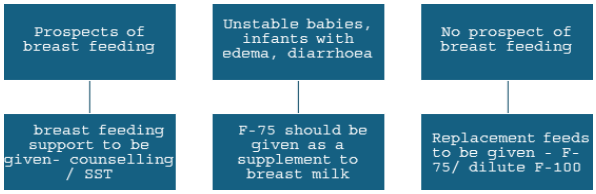
Because it is believed that breastfeeding alone will ensure appropriate nutrition, children under 6 months of age (U6M) have typically been left out of surveys and nutrition programs [5].

It has been shown that a large number of babies in this age range are not nursed exclusively. Malnutrition in newborns under six months of age (U6M) has been more common recently.

Since severe malnutrition contributes to under-5 mortality and morbidity, it is crucial to diagnose and treat it in infants less than six months.

Because of their physiological and pathological differences from older children, U6M infants require a specialized clinical strategy and therapy, with a focus on exclusive breastfeeding wherever feasible. Though relationships with extended families and communities are also significant, the mother-infant dyad is at the center of methods. [6] Evidence regarding alternative feeding modalities, such as formula 100, diluted formula-100, or infant formula, is limited, despite the fact that breastfeeding counseling and assistance is a crucial nutritional intervention. [7,8]This age group requires a different approach to dietary control than older infants, and it is labor-intensive. newborns with breastfeeding prospects (i.e., whose mothers are available and eager to breastfeed) and newborns without breastfeeding prospects can be roughly classified into two groups for nutritional management. [9] All available efforts should be directed toward the establishment of exclusive breastfeeding by the mother and proper feeding procedures.When an infant is receiving top feeds or partial breastfeeding, efforts should be taken to develop appropriate eating patterns and relactation.[9] Management seeks to promote breastfeeding and offer extra nourishment until the baby's breastmilk is adequate to sustain healthy growth in cases where the infant is solely breastfed and does not gain weight.

Either F-75 or diluted F-100 should be used if the infant has no chance of breastfeeding. If there are any medical issues or edema, F-75 should be utilized. After 24 hours, the feed should be progressively increased to the third hourly schedule from the initial second hourly schedule.



For the next 48 hours, the same quantity of diluted F 100, the catch-up diet, must be administered every three hours. The next step is to increase each feed by 10 ml until 30 ml/kg feed

is achieved.[9]

Diluted F-100 was introduced based on the fact that the solute load present in undiluted F-100 is greater than the handling capacity of the young infants. F-75 is given only in the stabilisation phase in cases of edema/ diarrhoea/ sick infant. Not many studies have portrayed nutritional interventions in severely malnourished infants managed according to WHO protocol.It is essential to describe the profile and outcomes of managing acute malnutrition in infants younger than six months in order to improve our understanding of the efficacy of current care strategies and establish the foundation for improved care in the future. As a result, our goal is to investigate the under 6 months severely malnourished infants for treatment outcomes such as the average duration of stay, discharge outcomes and average eight gain amongst those given only direct breast feed and those given only diluted f100/ f75 or both with or without breastfeeding.

Objectives Of The Study:

- The aims of this study were to identify factors associated with severe acute malnutrition in children < 6 months of age
- To evaluate the outcome of treatment after feeding them diluted therapeutic formula milk (F-100) and F-75 along with or without breast feeding vs only breast feeding.

Methodology

Source Of Data:

In patients admitted in Nutritional rehabilitation centre Vani Vilas hospital affiliated to Bangalore medical college and research institute

Methods Of Collection Of Data:

Study Design: Cross sectional observational study

Study Period: August 2022 to January 2024

Place Of Study: Department of Pediatrics, Vanivilas children Hospital attached to BMCRI, Bangalore.

Inclusion Criteria:

1) Age-1 month to 6 months infants of either sex
2) Having weight for length Z score less than 3 SD (severe wasting) or weight for age Z score less than 3 SD (severe underweight) on WHO growth charts
3) Parents willing to give consent according to annexure 1

Exclusion Criteria:

1) Infants less than 1 month or more than 6 months
2) Parents of the infants not willing to give consent
3) Not belonging to weight for length less than 3 SD or weight for age less than -3SD

Methodology:

Study Group

Infants aged 1 month to 6 months belonging to inclusion criteria

After obtaining approval and clearance from ethical committee, the patients fulfilling the inclusion criteria were enrolled for the study.

The weight of the children was measured using a digital weighing scale and length was measured using infantometer. Anthropometric indices was calculated using 2006 WHO standard growth charts. During the in-patient management breast feeding counselling support was provided to the mothers. In those infants with no prospects of breast-feeding formula 75, diluted formula 100 or mothers' milk from milk bank was given. Supplementary suckling technique was done to restore breast feeding in mothers who have insufficient milk. formula 75, diluted formula 100 was also provided along with breastfeeding in case of maternal milk insufficiency.

Number of infants receiving different nutritional interventions was assessed.

Statistical Analysis:

SPSS (Statistical Package for Social Sciences) Data was entered in the excel spread sheet

Data was analyzed by descriptive statistics such as mean, median, standard deviation, inter quartile range, percentage, tables and graphs wherever necessary.

Suitable parametric and non-parametric tests was used to determine significant difference between parameters.
$P<0.05$ was considered statistically significant.

RESULTS

A total of 242 infants were recruited for the study. The distribution of the sample population with respect to clinical profile is shown in Fig 1 and Fig 2.

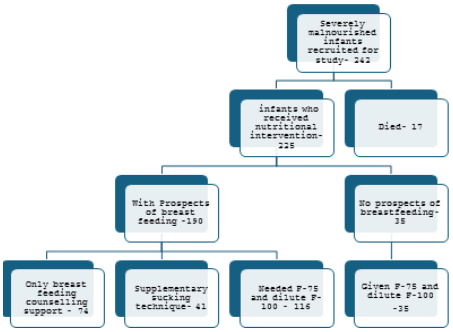
The age distribution indicates that a majority of the children, 68.2%, are between 1-3 months old, while the remaining 31.8% are aged 4-6 months suggesting younger infants were more prone for malnutrition. Gender distribution reveals a higher proportion of males (59.5%) compared to females (40.5%), In the sample population most children (89.3%) were born at term, while 10.7% were pre-term And it was seen that in the entire study population, 40.9% of the children were Sick New-born Care Unit (SNCU) graduates. The duration of stay in the study highlights that 27.7% of the children stayed for 1 week, 44.2% stayed for 2 weeks, 21.9% stayed for 3-4 weeks, and a small portion, 6.2%, stayed for 2-3 months. (Table 1)

The mean weight at admission for the 242 children is 3.15 kilograms, with a standard deviation of 0.89 kilograms. The minimum recorded weight being 1.5 kg and the maximum being 6.3 kg. Similarly, the mean length of the children is 52.6 centimetres, with a standard deviation of 5.25 centimetres, The recorded lengths range from a minimum of 39.0 cm to a maximum of 68.0 cm. (Table 2)

Pneumonia is the most common diagnosis, affecting 27.6% of the children (67 cases). This is followed by diarrhoea, which affects 16.5 % (40) of the study population. The average weight gain for the 226 children in the study is 10.12 grams/kg/day, with a standard deviation of 8.83 grams. This shows a considerable variation in weight gain among the children. The variability, as indicated by the standard deviation, suggests that while some children had significant weight increases, others had minimal or no weight gain. (Table 3)

The majority of the children,65 % (159 out of 242), achieved full recovery during the study period and 14.9% (36 children) only had Partial Recovery.However, 7.9% (19 children) were non-responders, 4.5% (11 children), were discharged against medical advice (DAMA) and 7% (17 children) of the study children did not survive . (Fig 3)

Nutritional interventions in under 6 months infants severely malnourished infants



DISCUSSION

Severe acute malnutrition (SAM) affects around 4 million infants under 6 months (u6m) worldwide, but evidence for their care is "very low" quality.

Severe malnutrition in under 6 months infants is leading to mortality and morbidity in them.

There are fewer studies on nutritional management of severe malnutrition in under 6 months infants.

In the present study it was found that majority of the infants presented with respiratory tract infections. Pneumonia (26.5%) was the most common clinical presentation in these infants. Followed by diarrhoea (%). In a prospective cohort pilot study conducted by Martha Mwangome et al similar findings were found. It was seen that Pneumonia was the commonest illness at admission (76%) followed by diarrhoea (29%).HIV exposure was 10%.[10]

In a presentation of case series conducted by Sabine B. et al in infants (n=632) depicted that the common clinical presentation was infectious disease at study entry (81%), particularly acute watery diarrhoea and respiratory tract infections.[11]

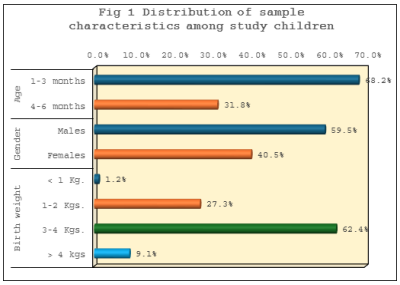
In the present study 65.7% showed recovery. The recovery rates were similar to that of a study conducted by Dharmendra Singh et al. [12]Thus, with optimal nutritional interventions and breast-feeding support mortality and morbidity due to undernutrition can be prevented in infants.

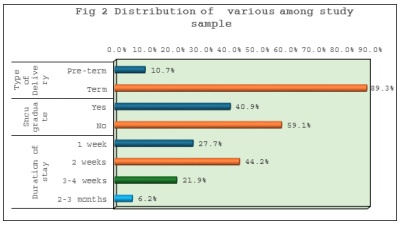
In our study we found that, the duration of stay, average weight gain and discharge outcomes were similar amongst the infants given F-75, dilute F-100 with or without breastmilk and those infants who were given only breast milk.

CONCLUSION

Severe malnutrition in U6M infants is a major contributor to under-5 mortality. It is important to ensure adequate nutrition in these babies to prevent short term and long-term adverse outcomes. The management of malnourished under 6 months infants, involving comprehensive inpatient care and outpatient follow up for mother- infant dyads, appears to result in stabilisation and recovery rates that align with acceptable standards.

Although, exclusive breast feeding remains the corner stone of the management, in those with no prospects of breast-feeding or maternal milk insufficiency dilute F-100 is an effective and safe alternative when breast feeding support followed by SST remains unsuccessful. Dilute F-100 can be used as safer alternative in case of maternal milk insufficiency or no prospects of breast feeding.





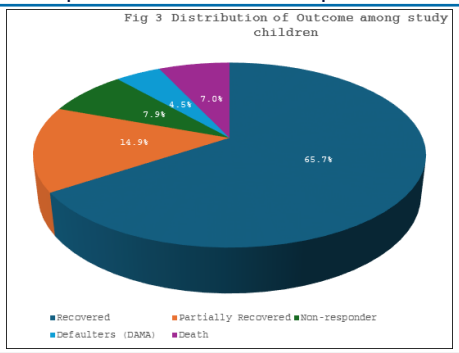


Table 1 Distribution of sample characteristics among study children

Variable	Category	n	%
Age	1-3 months	165	68.2%
	4-6 months	77	31.8%
Gender	Males	144	59.5%
	Females	98	40.5%
Type of Delivery	Pre-term	26	10.7%
	Term	216	89.3%
SNCU graduate	Yes	99	40.9%
	No	143	59.1%
Duration of stay	1 week	67	27.7%
	2 weeks	107	44.2%
	3-4 weeks	53	21.9%
	2-3 months	15	6.2%

Table 2 Distribution of Anthropometric parameters among study children

	N	Mean	SD	Min	Max
Weight at admission	242	3.15	0.89	1.5	6.3
Length	242	52.6	5.25	39.0	68.0

Table 3 Clinical Presentation Of The Study Population

Diagnosis	N	%
Pneumonia	67	27.6%
Add	40	16.5%
Primary	25	10%
URTI	12	4.9%
Bronchiolitis	10	4%
Sepsis	7	2.9%
Acute bacterial meningitis	6	2.5%
Hydrocephalus	6	2.5%
Congenital heart disease	8	3.3%
Others	29	11.9%
Anemia	6	2.5%
Surgical causes	15	6.2%
UTI	3	1.2%
Neonatal cholestasis	3	1.2%
Developmental delay	5	2%

Table 4 Distribution of Average Weight gain (gm/kg/day) among study children

Parameter	N	Mean	SD	Min	Max
Average weight gain	226	10.12	8.83	0.0	50.0

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