RESEARCH PAPER

Ready to-Use Supplementary Food in the Outpatient Management of Children with Acute Malnutrition in Basrah

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Abstract

Background Ready-to-use supplementary foods are high-energy, lipid-based provide energy, protein, fat, vitamins and minerals to treat acute malnutrition in children aged 6 -59 months.

Aim To evaluate the effect of ready-to-use supplement foods on the outpatient management of children with acute malnutrition.

Methods A prospective appropriate study was carried out on children with acute malnutrition who were referred to the nutritional rehabilitation center at Basra Teaching Hospital; were received ready-to- use supplementary foods at a quantity sufficient to meet their nutrient requirements for full catch- up growth and followed at two subsequent visits

Results Moderate wasting and underweight recorded in (66.7 %) and severe wasting in (33.33%) of the patients. Mean weight gain at the first and second follow-up visit was (5.78 ±2.43) and (6.52 ±2.75) g/kg/day respectively. There was a significant improvement in the weight for height Z score at the first and second follow-up visits after the administration of ready-to-use supplementary foods (P value < 0.05). Approximately 32% of the children aged 12-18-month experienced moderate weight gain. Bottle feeding with complementary feeding was reported in 24.19% of the children with moderate weight gain, and 9.52% and 34.68% of the children of illiterate parents and unemployed fathers respectively, showed moderate weight gain. Children belong to families with low income group accounted for 37.09% of those with moderate weight gain. Family income was the only variable that depend on the weight gain results (P value < 0.05). **Conclusion**: Ready-to-use supplementary food is significantly effective for outpatient management of acute malnutrition.

Keywords: Acute Malnutrition, Ready-to-Use Supplementary Food, Outpatients

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Introduction

Malnutrition in children is a global public health problem with wide implications. In 2011–2013, 14% and 25% of the children younger than 5 years of age in developing countries and in the least-developed countries respectively suffered from moderate to severe malnutrition were respectively. [(1)]

In 2018 a Multiple indicator cluster survey (MICS4) was carried out in Iraq; and showed that 2.9% and 0.8% of children under the age of 5 years were moderately or severely underweight respectively. Additionally, more than 9% of children were moderately stunted, and 3.2% of them were severely stunted. The results also indicated that almost 2.5% of children showed

moderate wasting, and 0.8% presented severe wasting [2].

Previously, the accepted approach for the management of acute child malnutrition was restricted to health facilities or therapeutic feeding centers (TFC), mainly because the recommended milk-based therapeutic food is intended for inpatient use only[1].

The facility- based approach is inadequate because it requires children and their caregivers to be admitted for several weeks. The development of ready-to-use supplementary foods (RUSFs) in the mid1990s has introduced a radical new approach to the management of acute child malnutrition.

Socio-demographic factors such as age, sex, family size, and number of children may indirectly contribute to a child's nutritional status and affect his or her health. The primary determinants of malnutrition are unsatisfactory food intake and severe or repeated infections. The nutritional status of children may also be affected by paternal and maternal occupation and education, marital status, family income, nutritional knowledge of the mothers, urban or rural residence, the child sex and water supply [3].

Methods

A prospective study conducted to assess the effectiveness of ready-to- use supplementary foods (RUSFs) in the outpatient management of acutely malnourished children who were referred to the Nutritional Rehabilitation Centre at Basrah Teaching Hospital for evaluation and nutritional supplementation from the 1 January to15 November 2017.

A total of 150 patients were enrolled in the study, and their ages ranged from 6 months to 60 months. **Inclusion criteria:** infants and children above 6 months of age with moderate acute malnutrition and those with severe acute malnutrition who had no medical complications (one or more danger signs of integrated management of childhood illness) and who passed the appetite test. **The exclusion criteria** were children with malnutrition caused by organic problems and those with a history of low birth weight, intrauterine growth retardation and preterm birth. The following information was recorded: **Identity**, parents**' age and education, present illness**, **feeding history and family income;** (classified as low, medium or high income). [4] Weight and length or height was assessed for all children and compared with the appropriate charts. An Informed consent was obtained from parents for the child enrollment in the study. The appetite test was performed for all patients; the **minimum amount of RUSF that should be consumed within 30 minutes to pass the appetite test is shown below:**

Body weight (kg)	Sachet (500 Kcal, or 92 g)
4 - 6.9	1/4 to 1/3
7 - 9.9	1/3 to 1/2
10 - 14.9	1/2 to 3/4
15 - 29.9	3/4 to 1
>30	> 1

Children who did not consume the amount of RUSF shown in the above table should be referred for inpatient care.[5]

A baseline visit history was taken and clinical evaluations and anthropometric measurement were performed for all patients. Nutritional supplement with RUSF Plumpy Sup®)in a quantity sufficient to meet the patients' nutrients' requirements for full catch-up growth.

Follow-up visit weight increments were recorded and compared with the Z score chart and weight gain per day. Follow-up for the defaulters was performed and appointments for upcoming follow-up visits were confirmed every two weeks. Data were analyzed using SPSS software version 23.

Results

The age of the studied patients was (6-59 months) and the mean age ±SD was 17.7±1.4 months.

Nutritional indicators of the studied children

The mean weight and length or height of the studied children were (7.9 ± 1.07) kg and (69.9 ±1.24) cm respectively. Two thirds of the studied children (66.67%) presented moderate wasting and underweight and one-third (33.33%) presented severe wasting. Only (21.43%) of patients were severely stunted. as shown in Table1.

Table 1: Nutritional indicators of studied children

Nutritional indicator	-2SD to -3SD (moderate malnutrition)		<- 3SD (severe malnutrition)		Total
	No.	%	No.	%	No. (%)
Wasting (WFH)	100	66.67	50	33.33	150 (100)
Stunting (HFA)	44	78.57	12	21.43	56 (100)
Underweight (WFA)	100	66.67	50	33.33	150 (100)

Defaulters and their Z scores

Most of the defaulters (18 from 26) were moderately malnourished. Table 2.

Table 2: Defaulters at the first and second follow-up visits

visit	Defaulters		Z score at follow-up visit	
	No.	%	-2 - to -3SD	<-3 SD
1st follow- up visit	17	11.33	12(8%)	5(3.33%)
2nd follow-up visit	9	6.00	6 (4%)	3 (2%)
Total	26	17.3	18(12%)	8(5.33)

Z scores at subsequent follow up visits

Table 3 shows that WHZ significantly improved by 2SD in (24.06%, 62.9%) of the patients at the first and second follow- up visits respectively. In addition to the significant number of WHZ patients who showed improvement at the second follow- up visits, the frequency of patients with WHZ <-2SD and<-3SD decreased from (57.9%) and (18.04%) to (29.84%) and (7.26%) respectively. P value < 0.05.

Table 3: Follow- up weight for height Z score (WHZ) in the studied patients

WHZ	Baseline visit	Follow-up visits		P value
		First	Second	
	No. (%)	No. (%)	No. (%)	
> -2SD	0 (0)	32 (24.06)	78 (62.9)	<0.05
(-2SD)–(-3SD)	100 (66.67)	77 (57.9)	37 (29.84)	
< -3SD	50 (33.33)	24 (18.04)	9 (7.26)	
Total	150	133	124	

Weight changes at follow-up visits

The mean weight gain was 6.15 ± 2.59 gm/kg/day. After the first follow up visit the mean weight gain was (5.78 ±2.43) g/kg/day, with 47.37% of patients achieving a moderate weight gain. Four weeks later; at the follow-up of 124 malnourished children, a mean weight gain of 6.52 ±2.75g/kg/day was recorded, 58.87% of children achieved moderate weight gain with significant results. P value < 0.05. as shown in Table 4.

Table 4: Weight gain for the patients at first and second follow-up visits

Follow-up visits	Mean weight gain ±SD	Weight gain (gm/kg/day)			Total	P value
		Poor (%)	Moderate (%)	Good (%)		
1st visit	5.78 ±2.43	53 (39.85%)	63 (47.37%)	17 (12.78%)	133 (100 %)	< 0.05
2nd visit	6.52 ±2.75	32 (25.81%)	73 (58.87%)	19 (15.32%)	124 (100 %)	

Relationship of selected patient variables to weight gain

Table 5 reveals that approximately 32% of the children in the 12-to18- month age group experienced moderate weight gain. Females and male children showed comparable weight gain. Twenty four percent of the children who had moderate weight gain were bottle fed with complementary feeding, 39.52% of the children with illiterate mothers and fathers experienced moderate weight gain. Among the patients who showed moderate weight gain 34.68% had unemployed fathers. Patients with moderate weight gain from low income families and from urban areas accounted for 37.09% and 35.48% of the children respectively.

Multiple logistic regression analysis showed that only low family income was related to poor weight gain **(Table 6)**

Discussion

This study enrolled children with moderate and severe malnutrition according to WHO criteria were managed at home with nutritional supplementations. This management strategy is consistent with current WHO guidelines for the treatment of children with moderate acute malnutrition (MAM) at home with therapeutic formulas. [6]

The defaulters were those patients who did not return for follow-up visits. In the current study which had a four- week follow- up period, the total number of defaulters was 26 (17%); in comparison in a six-week follow-up study in South Africa, the total number of defaulters was 87. [7] The possible causes of a high number of defaulters as follow: distance to the hospital, poor weight gain, poverty, large family size, parents did not consider malnutrition a disease that needs treatment or follow up because of poor education.

The study revealed a significant improvement in the anthropometric measurements Z scores of the studied malnourished children during subsequent follow- up visits.

This improvement is clearly demonstrated by the weight gain of the studied children due to the positive effect of ready -to -use supplementary foods (RUSFs) on nutritional status and education provided to the mothers regarding the benefit of RUSF and the importance of follow-up visits for maintaining weight changes. This result is consistent with Liana Steenkamp et al. [8]

The effect of patients' variables on the rate of weight gain at the second follow-up visits reveals that approximately one-third of children with moderate weight gain were between 12and18months old and one-quarter of the patients were bottle fed with complementary feeding (50% of the studied patients were bottle fed with or without complementary feeding). Nearly the same percent of bottle feeding was recorded in a previous study performed in Basrah.[9] Good weight gain enhances the recovery of severely and moderately malnourished patients.

Most of the patients' variables could predict weight gain at subsequent visits, according to multiple regression analysis.

Family income was the only patient variable that could be predict the weight gain ($R^2 = 0.03$, P value < 0.05). It is easy to explain the impact of family income on weight gain, which is mainly related to food sufficiency. Mengesha MM et al discussed some of these risk and found similar results. [10]

Conclusion

Ready-to-use supplementary food is significantly effective in the outpatient management of acute malnutrition.

Conflict of interest: The authors declare no conflict of interest.

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Table 5: Selected patient related variables to weight gain

Character	Variables		Weight gain			
			Poor No. (%)	Moderate No. (%)	Good No. (%)	P value
Age (months)	6-12		9 (7.26)	21 (16.93)	6 (4.84)	>0.05
	>12-18		61(12.9)	40 (32.26)	10(8.06)	
	>18 -56		7 (5.65)	12 (9.68)	3 (2.42)	
Sex	Male		17 (13.7)	39 (31.45)	8 (6.45)	>0.05
	Female		15 (12.1)	34 (27.42)	11 (8.87)	
Feeding	Breast feeding		4 (3.22)	3 (3.23)	3 (2.41)	<0.05
	Bottle feeding		5 (4.03)	4 (6.45)	2 (2.42)	
	Mixed feeding		4 (3.22)	5 (4.03)	2 (1.61)	
	Complementary	Breast feeding	6(4.83)	12 (9.67)	6 (6.45)	<0.05
		Bottle feeding	6 (6.45)	30 (24.19)	3 (2.41)	
		Mixed feeding	5 (4.03)	12 (9.67)	3 (2.41)	
		Only	2 (1.61)	5 (4.03)	0 (0)	
Mother's education	Illiterate		12 (9.67)	49 (39.52)	10 (8.06)	>0.05
	Primary		10 (8.06)	12 (9.67)	3 (2.42)	
	Intermediate and above		10 (8.06)	12 (9.67)	6 (4.83)	
Father's education	Illiterate		11 (8.87)	49 (39.52)	11 (8.87)	>0.05
	Primary		11 (8.87)	11 (8.87)	3 (2.42)	
	Intermediate and above		10 (8.06)	13 (10.48)	5 (4.03)	
Father's occupation	Employed	Unemployed	18(12.5)	30 (24.19)	6 (4.84)	>0.05
			14 (11.3)	43 (34.68)	13 (10.48)	
Family income	Low		17(13.7)	46 (37.09)	13 (10.48)	<0.05
	Medium		13(10.5)	26 (20.97)	5 (4.03)	
	High		2 (1.61)	1 (0.80)	1 (0.80)	
Residency	Urban		19 (15.3)	44 (35.48)	12 (9.67)	>0.05
	Rural		13 (10.5)	29 (23.39)	7 (5.64)	

TABLE 6: MULTIPLE LOGISTIC REGRESSION ANALYSIS		
Variables	R^2	P value
Age	0.001	0.715
Sex	0.01	0.225
Feeding	0.0004	0.808
Mother's education	0.006	0.364
Father's education	0.01	0.248
Father's occupation	0.01	0.145
Family income	0.03	0.028
Residency	0.01	0.893

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