ORIGINAL ARTICLE

EFFECTIVENESS AND ACCEPTABILITY OF READY-TO-USE THERAPUETIC FOODS AMONG MALNOURISHED CHILDREN IN A TERTIARY CARE HOSPITAL

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Background: Ready-to-use-therapeutic foods (RUTF) are an important component of the effective outpatient treatment of severe wasting because most of the child deaths in the world especially in developing countries is due to malnutrition. The objective of the study was to evaluate the effectiveness and acceptability of ready to use therapeutic food among malnourished children in a tertiary care hospital. **Methods:** An observational exploratory study based on sixty subjects with 3–120 months of age, malnourished children were chosen by universal sampling from Children Hospital Lahore, Pakistan, during the time period 1st September 2012 to 30th November 2012 with the approval of ethical committee. The study tool for investigation was a well-structured questionnaire. **Results:** The highest proportion of malnourished children belonged to urban areas (71.67%) and age group <24 months (65%).The effect of RUTF on weight for height and weight for age Z score from baseline to the end of follow-up was statistically significant (Paired sample *t*-test) (p=0.000, 0.000) but there was no significant effect of RUTF on height for age (p-value=0.14).The acceptance of food among patients was good, the proportion of patient was higher who consumed ready to use therapeutic food easily (70%), percentage of vomiting (16.7%) and complaints of diarrhoea (46.7%) after taking RUTF was less in patients. All mothers were satisfied from ready to use therapeutic foods (100%). **Conclusion:** Malnourished children gained weight after the short term supplementation of ready to use therapeutic food but had no significant effect on height of the patients. Its acceptability in term of taste, amount consumes and demand was good. Mother's perception was also satisfactory regarding these foods.

Keywords: Malnutrition; children; ready to use therapeutic food; RUTF

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INTRODUCTION

More than 50% of childhood mortality under the age of 5 years is due to malnutrition; near about 3.5 million malnourished children die each year in the developing countries.[1] Lack of micronutrient enriched foods, inadequate breastfeeding are the major causes of malnutrition.[2] Mostly infections like diarrhoea, malaria, measles and pneumonia more frequently affect malnourished children.[3]

Recently, a therapeutic food (RUTF) was introduced to treat severe wasting among malnourished children. RUTF is a home based treatment because it has very low risk of bacterial contamination due to its dehydrated and sealed packing.[1] RUTF does not need refrigeration for prolonging its storage life because it includes low moisture contents and it does not require any preparation.[4] RUTF contains nutrients like peanut, oil, sugar and milk powder.[5] There are different types of RUTF but F-75, F-100 and Plumpy Nuts are commonly used.[6] F-75 formula is used for stabilization and F-100 formula is used for rehabilitation.[7] F-75 and F-100 are in powder milk form and it is used to treat malnutrition.[8] Plumpy Nuts (combination of two words plump and peanuts) is a nutritional paste consisting of peanut with vitamins that provides 500 kilocalories in each packet.[5] RUTF is associated with rapid weight gain among malnourished children.[5–7]

We conducted a study to assess the response of RUTF among malnourished children under hospital conditions. The aim was to evaluate the outcomes of therapeutic food intake by the malnourished children reporting to the Children's Hospital OPD at preventive paediatrics in term of effectiveness and acceptability.

The primary objective was to assess the effectiveness in term of improvement in Weight for Age, Height for Age and Weight for Height of individual malnourished child after taking the RUTF in hospital and assess the reduction of wasting in children 3–120 months of age after 3 months. Acceptability of RUTF in term of amount consumed, demand, mother's perception about food and refusal of RUTF was also examined.

MATERIAL AND METHODS

The study based on malnourished children aged 3–120 months who came to the outpatient care centre of Children's Hospital, Lahore for the treatment of severe wasting. Time duration of therapy was from 1st September to 30th November 2012. An observational

exploratory study design was used to analyse the effectiveness in term of height and weight gain of patients after taking RUTF and acceptability in term of amount consumed, demand, mother's perception and refusal of RUTF among these malnourished children. Those patients were included in the study whose age from 3 months to 10 years and ability of their parents or guardians to provide correct information. Both males and females were eligible for the study. All those included had moderate to severe malnutrition (-2SD to -3SD). Children with serious complications or refusal of the parents & guardians to give information were excluded from the study. Universal Sampling technique was used to collect data. Interactive C-Size Epidemiological Calculator [WHO] was used to calculate the sample size with 95% confidence Interval, Power of 90% and difference in proportion of 20%.5 Sixty patients were included in the study. Children with weight-for-height <-2SD of the WHO Child Growth Standards received a daily distribution of recommended amount of RUTF. All the patients were screened for conditions requiring medical treatment throughout follow up.

All patients were selected for study from outdoor patient's therapeutic centre (OPD) and stabilization unit (SU) of Children's Hospital from 1st September to 30th November. OPD patients came to hospital on daily basis and children with severe malnutrition admitted in stabilization unit (SU). Patients came to hospital all parts of the country. Written informed consent was obtained from each patient's mother. For the study, a standardized questionnaire was used at each follow-up visit to obtain information on the major health events and feeding practices. Questionnaire was contained information about age, mother's education, socio demographic characteristics, child health history and family income of children. Whole treatment was divided into three phases. During the first phase of treatment, all patients received free of cost packets of F-75 formula 6 times/day according to WHO recommendation. We fed first dose of F-75 formula to all children according to their age in OPD and counselled their mothers for remaining doses. In SU, nurses fed F-75 to severe malnourished children very carefully after every 4 hours. After 4 days visits, when children were stable then we started F-100 formula 6 times/day for rehabilitation. Recovery phase took 4–5 days, after that third phase was started. In this phase all children received plumpy nuts packets for 15 days and children in SU also discharged with plumpy nuts. All children were examined after 15 days by physician. We assessed their height in cm and weight in kg on daily basis by using instruments throughout treatment. Weight measured by using children weight machine and height recorded by using height measuring board. Feeding practices also recorded on daily basis either children finished their whole doses or not and about their demand of food after each dose. We also assessed the vomiting and complaints of diarrhoea after taking RUTF. We examined the time duration of children take to finish RUTF. We recorded their Z-Scores according to WHO growth charts. Mothers who have experienced RUTF were interviewed. Researcher was personally asked questions from children's mother. We also asked the mother's perception about RUTF to judge its effect on child health.

The data was entered and analysed using SPSS 20. Anthro and Anthroplus calculator also used for standardized measurements of age, weight & height. Frequencies and percentages were given for qualitative variables. Kolmogrov-Smirnov test of normality was applied for testing the assumption. Chi square test was applied to assess the significance of categorical variables. The Paired student's *t*-distribution was applied to examine weight and height gain after treatment.

RESULTS

Out of total 60 patients, 39 (65%) children belonged to age group less than 24 months, 17 (28.3%) children belonged to 24–60 months, 4 (6.7%) belonged to greater than 60 months. Males were 31 (51.67%) while 29 (48.33%) were females. Of the patients 17 (28.3%) belonged to rural area and 43 (71.67%) belonged to urban area (Table-1).

The mean weight for age, weight for height and height for age of all patients before treatment was -3.66±1.33 (95% CI: -3.99, -3.31), -3.91±1.40 (95% CI: -4.28, -3.53) and -3.79±1.63 (95% CI: -4.22, -3.37) but mean weight for age, weight for height and height for age of patients after treatment was -2.81±1.33 (95% CI: -3.53, -2.74), -2.26±1.34 (95% CI: -3.62, -2.06) and -3.62±1.59 (955CI: -4.03, -3.21). *p*-values examined for identify the significant difference between pre and post effect on weight for age, weight for height and height for age gain of children after treatment were 0.000,0.000 and 0.14 (Table-2).

A total of 60 malnourished children, 35 (58.33%) children did not demand to eat more RUTF after their recommended food and 25 (41.67%) children demanded to eat more RUTF (*p*-value 0.197). The mean time duration to finish one dose of RUTF was 16 minutes. Of the children 18 (30%) were not consuming RUTF easily and 42 (70%) children were consuming it easily (*p*-value 0.002).Children vomiting after taking RUTF were 10 (16.67%). On the other hand, 50 (83.33%) accepted RUTF (*p*-value 0.000).Children had no complaints of diarrhoea after taking RUTF 32 (53.33%) and 28 (46.67%) children had (*p*-value 0.606) (Table-3). All mothers were satisfied from RUTF 60 (100%).

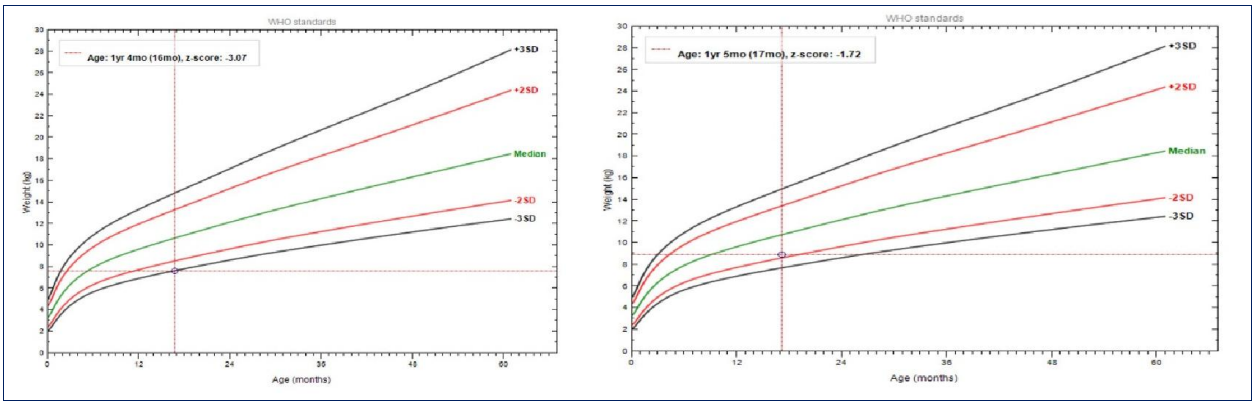

Figure-1: WHO anthropometric Z-Scores of weight for Age, before and after treatment of one patient.

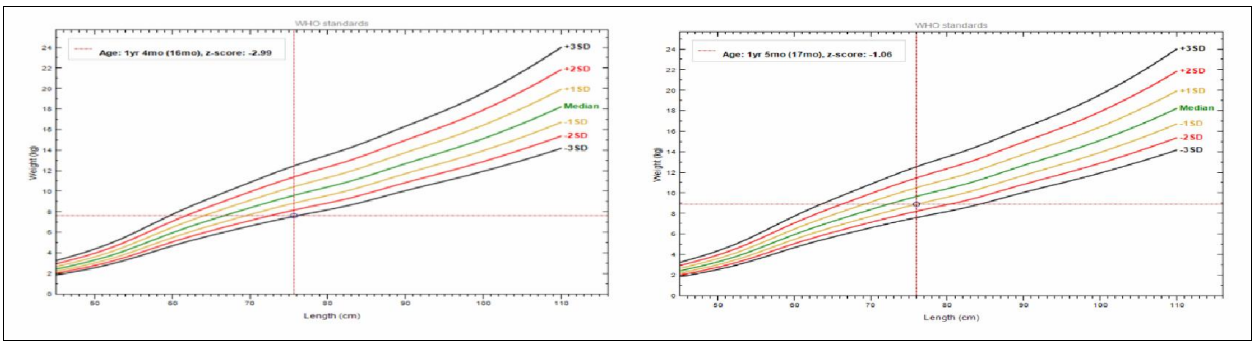

Figure-2: WHO anthropometric Z-Scores of weight for Height, before and after treatment of one patient.

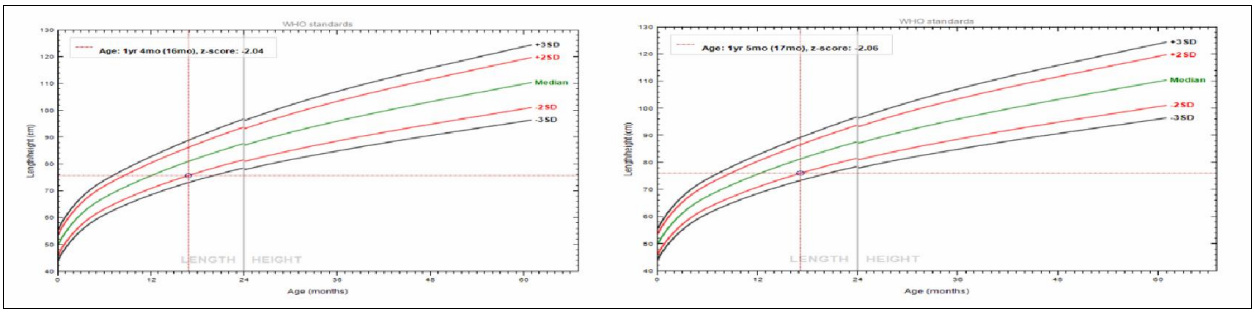

Figure-3: WHO anthropometric Z-Scores of Height for Age, before and after treatment of one patient

Table-1: Demographic characteristics of sixty malnourished patients

Age of Patients (in months)	**Frequency%**	***p*-Values**
<24	39 (65%)	0.000
24-60	17 (28.3%)	
>60	4 (6.7%)	
Gender		0.796
Boys	31 (51.7%)	
Girls	29 (48.3%)	
Area		0.001
Rural	17 (28.3%)	
Urban	43 (71.7%)	
Mother's Education		0.000
Read & Write	23 (38.3%)	
Only Read	3 (5%)	
Illiterate	34 (56.7%)	

Table-2: effect of RUTF on height and weight gain of children after treatment

Measurements n=60	**Before Mean±SD**	**Before 95% CI**	**After Mean±SD**	**After 95% CI**	***p***
Weight for Age	-3.66±1.33	-3.99, -3.31	-2.81±1.33	-3.52, -2.74	0.000
Weight for Ht	-3.01±1.40	-4.28, -3.53	-2.26±1.34	-3.62, -2.06	0.000
Height for Age	-3.79±1.63	-4.22, -3.37	-3.62±1.59	-4.03, -3.21	0.14

Table-3: Acceptability of RUTF among sixty malnourished children

Demand of children after taking RUTF	Frequency %	*p*-Value
No	35 (58.3%)	0.197
Yes	25 (41.7%)	
Easily Consume RUTF		
No	18 (30%)	0.002
Yes	42 (70%)	
Vomit After Taking RUTF		
No	50 (83.3%)	0.000
Yes	10 (16.7%)	
Diarrhoea		
No	32 (53.3%)	0.606
Yes	28 (46.7%)	

DISCUSSION

This study was conducted to examine the effect and acceptability of RUTFs on malnourished children in a tertiary care hospital. Our study demonstrated a significant effect of RUTFs on the weight for height and weight for age Z scores, but there was no effect on height for age Z scores before and after treatment. This is likely due to the fact that the present study time period was three months and previous studies were conducted for over 1 year. Our study results show that, in terms of acceptability approximately all children demanded more RUTFs after their recommended dose. Most children digested these foods easily. The vomiting observed in 17% of the children may have been due to gastrointestinal issues. Overall, mothers were satisfied with the product as their children's health was improving.

Wasting (Weight for height Z score <-2) is an important contributor of child mortality affecting approximately 10% of children less than 5 years all over the world.[5] RUTFs have shown positive results in the treatment of severe wasting.[5]

Studies conducted in low and middle income countries have found comparable results.[5,9] Isanaka S[5] found a significant difference in the Z scores in weight for height and height for age between the intervention and non-intervention groups in their study on Malawian children (p=0.001). Children gained significant weight after the treatment for a period of one year. The effect of RUTFs on height for age however, was limited. Thakur GS[7] found a significant difference in rate of weight gain in the RUTFs group (p=0.0001) in their study with Indian children. Similarly, Ciliberto[8] observed that the RUTFs group was more likely to achieve a weight for height Z score >-2 as compared with those who received standard normal therapy (p<0.001). RUTFs are associated with better results for childhood malnutrition. Diop el HI[9] found a greater effect of weight gain in the most wasted children in Senegal (p<0.05).

Dibari F[14] found that in a Kenyan, general preference, taste and sweetness scores for RUTFs were higher as compared to the control group (p<0.05).

CONCLUSION

This study concludes that the distribution of RUTFs to malnourished children 3–120 months of age is effective in limiting reductions in weight for height and weight for age Z scores in the short-term. These products are very useful for rapid change in weight within a very limited time period. Malnourished children consumed it easily and its acceptability was good among them. This suggests that in this study we only addressed the effect of RUTFs on weight and height gain of malnourished children due to limited time period but case control study requires assessing the effectiveness of RUTFs with the comparison of local made food and long-term improvements.

AUTHOR'S CONTRIBUTION

SZ conceptualized the study, reviewed the analysis, provided necessary feedback and reviewed article critically. AB designed the study, collected data, carried out analysis and drafted the initial manuscript.

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