Investigation of Food Acceptability and Feeding Practices for Lipid Nutrient Supplements and Blended Flours Used to Treat Moderate Malnutrition

Richard J. Wang, MD[1]; Indi Trehan, MD[1]; Lacey N. LaGrone, MD[1]; Ariana J. Weisz, BA[1]; Chrissie M. Thakwalakwa, MS[2]; Kenneth M. Maleta, PhD[2]; Mark J. Manary, MD[1,2,3]

ABSTRACT

Objective: To examine acceptability and feeding practices associated with different supplementary food items and identify practices associated with weight gain.

Methods: Caregivers (n = 409) whose children had been enrolled in a trial comparing a fortified corn-soy blended flour (CSB++), soy ready-to-use supplementary food (RUSF), and soy/whey RUSF answered a questionnaire administered by health workers in their homes.

Results: No significant differences in acceptability of food types were found. CSB++ was more likely than soy RUSF or soy/whey RUSF to be shared (21% vs 3% vs 8%, respectively, $P < .001$). Children who received soy/whey RUSF were more likely to feed themselves than children who received soy RUSF or CSB++ (11% vs 4% vs 3%, respectively, $P < .05$). Refusing food was associated with slower weight gain.

Conclusions and Implications: Despite similar acceptability, feeding practices differed among food types. Increased nonstaple food consumption is associated with weight gain.

Key Words: moderate malnutrition, supplementary feeding, CSB++, ready-to-use food, child (*J Nutr Educ Behav*. 2013;45:258-263.)

INTRODUCTION

Moderate acute malnutrition (MAM) in children, defined as a weight-for-height Z-score (WHZ) <-2 but ≥-3, remains a worldwide scourge. Affected children experience an increased number of infections, delayed cognitive development, and decreased adult stature and productivity.[1-3] Children with MAM are at 3 times greater risk of death than their well-nourished counterparts.[4]

Two of the most common supplementary food items used to treat MAM are fortified blended flours and ready-to-use supplementary food (RUSF).[5] In addition to cost and availability, these food items differ in taste, texture, preparation, shelf life, and familiarity to beneficiary populations. Ready-to-use supplementary food items themselves can differ in taste, texture, and packaging. These qualities can influence the acceptability of the supplement as well as caregiver feeding practices, which in turn may influence individual treatment outcomes and the success of a supplementary feeding program. Identifying and understanding differences in acceptability and feeding practices of supplementary food items are relevant to both clinicians and program managers working to treat MAM.

Studies associating food acceptability and feeding practices with clinical outcomes for acute malnutrition are lacking. The acceptability of fortified blended flours and RUSF have been documented in individual studies,[6-9] but only 1 study has compared them directly and found them equally acceptable.[10] That study also found RUSF less likely than flours to be left over after a meal, and that leftovers were associated with smaller improvements in weight-for-age Z-score.[10]

This study explores the acceptability and feeding practices of supplementary feeding in a previously reported large clinical trial by comparing a fortified blended flour to 2 types of RUSF; it also tests the hypothesis that differences in food acceptability and feeding practices are associated with weight gain in children treated for MAM.[11]

METHODS

Study Participation and Design

Data for this study were collected from October, 2009 to July, 2010 as part of a randomized clinical effectiveness trial comparing 3 supplementary food items in treating children with MAM in southern Malawi.[11] Participants in the study were children

[1]Department of Pediatrics, Washington University School of Medicine, St. Louis Children's Hospital, St. Louis, MO
[2]Department of Community Health, College of Medicine, University of Malawi, Blantyre 3, Malawi
[3]Children's Nutrition Research Center, Baylor College of Medicine, Houston, TX
Address for correspondence: Mark J. Manary, MD, Department of Pediatrics, St. Louis Children's Hospital, One Children's Place, St. Louis, MO 63110; Phone: (314) 454-2178; E-mail: manary@kids.wustl.edu

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who were enrolled in the clinical trial at 1 of 3 government-operated health centers and their primary caregivers. Enrollment criteria for the trial were age between 6 and 59 months, WHZ score <-2 and >-3, absence of bipedal pitting edema, and absence of any history of chronic debilitating congenital or neurologic disease. This study was approved by the University of Malawi, College of Medicine Research and Ethics Committee and the Human Research Protection Office at Washington University.

Procedure

Children with MAM were randomized to receive 1 of 3 different supplementary food types: a fortified corn-soy blended flour (CSB++), soy RUSF, or soy/whey RUSF. CSB++ (produced by Rab Processors, Blantyre, Malawi, under supervision of the World Food Programme) is a corn-soy blended flour fortified with dried skim milk powder, soy oil, sugar, and a micronutrient premix. It was packed in 250 g bags and required cooking by the caregiver to become an edible porridge. Soy RUSF (produced by Project Peanut Butter, Blantyre, Malawi) is a lipid paste containing whole extruded soy flour, peanut paste, sugar, and a micronutrient premix. Soy/whey RUSF, also known as Plumpy'Sup (produced by Nutriset, Malaunay, France), is a lipid paste containing peanut paste, whey powder, cocoa, and isolated soy protein. Both RUSF products were packaged in 92 g foil sachets and did not require preparation before consumption. Nutrient composition of these food types has been detailed elsewhere.[11]

At enrollment, each child received a 14-day supply of supplementary food at a dose of approximately 314 kJ/kg/d (75 kcal/kg/d). Children returned to the health center every 2 weeks for anthropometric evaluation. Participation was complete when the child reached a recovery WHZ >-2, received 12 weeks of supplementary feeding without recovery, developed severe acute malnutrition, died, or dropped out.

At each visit, senior research nurses advised caregivers to avoid giving supplementary food to anyone other than the malnourished child. Caregivers for children randomized to an RUSF were also advised to feed the supplementary food directly from the sachet and not to use the RUSF as an ingredient in porridge or other prepared food.

An Acceptability and Use Survey (AUS) questionnaire of 11 closed-ended questions was developed to gather data on the acceptability of the supplementary food items and caregiver feeding practices. The AUS questionnaire was developed by the investigators' team of senior research nurses, who were fluent in the local language and culture. The nurses formulated the wording of the questions after holding focus group discussions with mothers to better understand how they might interpret/understand the questions. After the final version of the AUS was developed, it was piloted among 50 mothers for retest reliability and found to be in >98% concordance for all 11 questions. The AUS included questions about food acceptability, food sharing, and food sharing behaviors. Community health workers at 3 health centers were trained to use the AUS by 1 of the study investigators and instructed to administer the AUS to the primary caregiver within 10 days of the child's enrollment into the trial.

Data Analysis

Baseline enrollment characteristics and treatment outcomes were calculated as mean ± SD for continuous measures and n (%) for categorical measures. Anthropometric indices were based on the World Health Organization's 2006 Child Growth Standards[12] and calculated using Anthro (version 3.1, WHO, Geneva, Switzerland, 2010). The primary clinical outcome of interest was rate of weight gain (g/kg/d) over the first 4 weeks of treatment.

Enrollment characteristics, outcomes, and answers to the AUS were compared among treatment groups using chi-square analysis for discrete variables and ANOVA for continuous variables (Open Source Epidemiologic Statistics for Public Health, version 2.3.1, OpenEpi, Cambridge, MA, 2010). Dietary diversity was scored by summing the total number of staple servings per day, total number of nonstaple servings per day (vegetable or fruit, beans, meat, snacks, and other), and total number of animal source food servings per day using caretakers' responses to a dietary survey.

Multivariate linear regression modeling using SPSS Statistics (version 19.0, IBM, Somers, NY, 2010) was used to examine whether variables derived from the AUS were independently associated with weight gain. Explanatory variables were selected with backward elimination. The final model controlled for the type of supplementary food, age, sex, enrollment mid-upper arm circumference, enrollment WHZ, whether the child was breastfeeding or not, whether the child's mother was alive, and days of fever and diarrhea prior to enrollment.

RESULTS

Caregivers (n = 409) were contacted by community health workers and agreed to answer the AUS (Table 1). Consistent with findings in the clinical effectiveness trial, there were no significant differences in clinical outcomes among the 3 intervention groups.[11]

As shown in Table 2, there were no significant differences in the acceptability of the 3 food items. In total, 27% of caregivers reported that their child "always" or "sometimes" refused to eat the supplementary food. CSB++ was more likely to be shared with other children than were the RUSF (21% for CSB++ vs 3% for soy RUSF and 8% for soy/whey RUSF, $P < .001$). Children who received soy/whey RUSF were more likely to feed themselves compared to children who received soy RUSF or CSB++ (11% vs 4% and 3%, respectively, $P = .01$).

Multivariate linear regression modeling was used to determine which AUS responses were associated with greater weight gain. Variables included were caregiver hand washing, difficulty consuming full ration, refusal to eat supplementary food, acknowledgment of sharing food or leftovers, the frequency of meat consumption, and the frequency of nonstaple food consumption (model coefficient of determination = 0.36). Increased servings of nonstaple food items were associated with improved weight gain ($\beta = 0.23$, $P < .05$), whereas refusal to eat supplementary