Ready-to-use therapeutic foods

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BACKGROUND

Malnutrition is one of the most serious problems facing the world today. The World Health Organization (WHO) estimates that a third of all children deaths can be attributed to malnutrition. The primary cause of malnutrition for the majority of the world’s population is undernourishment: around 2 billion people are estimated to be malnourished globally.1

Malnutrition impairs the body’s ability to perform a number of functions, including mounting immune responses to pathological insults as well as recovering from those insults. This is particularly evident in acutely malnourished children, whose inability to respond to pathogens is largely responsible for the high case fatality rate of many childhood diseases in developing countries. Additionally, malnutrition leads to failure to grow and thrive, developmental delays and illness, among other adverse effects on the body.

For many intergovernmental and nonprofit organizations, responding to malnutrition can be a difficult challenge. Providing a compact, affordable and nutritious supplement that is resistant to bacterial contamination is ideal, but often proves to be difficult in famine-stricken rural regions. In recent years, the development of ready-to-use therapeutic foods (RUTFs) has been hailed as a milestone in the fight against malnutrition. RUTFs are targeted primarily at acutely malnourished children in the age-range 6 to 59 months with a sufficient appetite, but who do not suffer severe medical complications.2 RUTFs are a significant source of caloric intake and micronutrients. They are aimed at restoring a healthy weight to malnourished children and decreasing the incidence of wasting and severe wasting.

CONTENT

RUTFs are energy-dense, micronutrient-rich, homogeneous lipid pastes. Their contents vary somewhat across geographical regions depending on the availability of raw materials and industrial capability. However, they are often based on the F-100 formula (the standard therapeutic food deployed for severe malnourishment) with the addition of peanut butter. Standard RUTFs consist of peanut butter, milk powder, oil, sugar, vitamins and minerals.3 The main minerals supplemented are iron, zinc, magnesium, copper, potassium, selenium and iodine. Other micronutrients include, among others, B vitamins such as folate and niacin.4

In terms of caloric content, most RUTFs contain between 520 and 550 kcal/100 g. Of that, 45% to 60% is provided in the form of lipids; another 10% to 12% is provided in the form of proteins.2 Administration to malnourished children is based on their weight and caloric needs.

Due to their low water content—2.5% at most—RUTFs do not provide a favorable environment for bacterial growth and have a shelf life of approximately two years. Additionally, they do not require cooking and have an acceptable taste to children. All these properties facilitate their use in remote and rural regions.

ADMINISTRATION

An important advantage of RUTFs is their suitability for use by community members and nonmedically trained staff. Oftentimes, they are used in remote locations beyond the reach of the healthcare systems of famine-stricken countries. To that end, research on RUTFs has focused on their effectiveness in community-based and home-based administration settings. The target population of these interventions are acutely malnourished children. Of particular concern in this segment are children with acute or chronic diseases. Malnourishment’s negative impact on the immune system adds to mortality and morbidity associated with those diseases.

Community-based administration has been studied in a number of countries, with several positive results reported. For instance, research on the use of RUTF in Malawi during the 2006 famine showed promising results. In one study of around 800 malnourished children in remote regions, 94% recovered healthy weight after only 8 weeks of RUTF supplementation, with a mean body weight gain of 2.7 g/kg/d.5 The study demonstrated that RUTF supplementation can be successfully administered by community centres outside the formal healthcare framework.

Research on RUTF home administration without the need for medically trained personnel has yielded acceptable results as well. Linneman et al tested 3 models: medical professionals administering the treatment; community health aides administering the treatment to patients referred by medical professionals; and community health aides administering the treatment without the involvement of medical professionals. Their results showed that level of training was not correlated with better outcomes and similar results were obtained from the 3 models.6

Additionally, home-based therapy with RUTF has shown superiority to standard therapy in similar settings. The standard treatment employed to help severely malnourished children is based on World Health Organization (WHO) guidelines, and is usually administered in two phases: the first phase involves modest-protein, modest-energy milk-based liquid food and antibiotics, and the second phase uses high-protein, high-energy milk-based liquid food. In a study comparing this standard therapy to locally produced RUTF therapy in a population of 1200 severely malnourished children in Malawi, Ciliberto et al showed that the RUTF group had a greater recovery rate and lower incidence of fever, cough and diarrhea.7

Similarly, in a study of children at risk of malnutrition, but who are not yet malnourished, RUTF showed superiority to standard supplemental fortified cereal/legume-blended food. Patel et al compared the effectiveness of the standard micronutrient-fortified corn/soy-blend to RUTF in Malawi and found the latter to be 3 times as effective as the standard corn/soy-blend.8 Short-term preventive use of RUTF in nonmalnourished children was also found to be effective in the Niger in reducing the incidence of wasting and severe wasting.9 Children infected with HIV also benefited from RUTF relative to those who used traditional foods.3
CHALLENGES

LOCAL PRODUCTION, COST AND USE

While the effectiveness of RUTF in reducing malnutrition has been shown in some settings, local production of RUTF remains a particular challenge. In addition to ingredient availability, the production of RUTF requires—a at minimum—a room free of pests and a mechanical mixer. Adequate monitoring and quality control is needed to prevent contamination and ensure safe storage and packaging. RUTF generally contains little water content, making bacterial contamination difficult, but not impossible. Additionally, due to the peanut content, aflatoxins produced by Aspergillus are of particular concern. Salmonella contamination has also been reported.

The cost of RUTF is yet another obstacle. According to the United Nations Children’s Fund (UNICEF), the price of RUTF has been steadily decreasing for the past decade, but it is still relatively high. Data from 2013 shows the cost of one RUTF carton containing 150 sachets weighing 92 g each is around US$55. Locally produced RUTF has generally the same price point as RUTF produced in the United States or France, with production costs of around US$2.6/kg. This makes it beyond the reach of many families impacted by malnutrition.

Finally, Latham et al argue that RUTF could have significant adverse effects on the health of children targeted with this therapy. For instance, RUTFs contain little water but the need for children to consume water increases with the consumption of RUTFs. This in turn increases the chances that children may acquire waterborne illnesses common in famine-prone regions.

NEED FOR FUTURE RESEARCH

Despite the positive results from several trials, some researchers remain skeptical about the use of RUTF, especially for home-based malnutrition therapy. Schoonees and Latham argue that unbiased evidence is lacking and, as of last year, research is insufficient to positively establish the superiority of RUTF to standard therapy. Gera argues that almost all the evidence associated with the use of RUTF comes from sub-Saharan Africa, making generalizations to other geographic locations difficult.

CONCLUSION

Ready-to-use therapeutic foods are relatively affordable and nutritious supplements with a reasonable production potential. While their home-use remains controversial in some settings, RUTFs have been shown to be effective in a variety of circumstances. More research is needed to verify these findings and study the use of RUTF in more diverse situations and purposes, including their preventative use in children prone to malnutrition.

REFERENCES