Lactose and whey permeate and acute malnutrition

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Funding:	Danish Dairy Research Foundation
Project manager:	Kim Fleischer Michaelsen, Professor
Institution:	Department of Nutrition and Sports, SCIENCE, University of Copenhagen The intervention studies are conducted in collaboration with the infant nutrition unit of Mulago University Hospital, Kampal.
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Aim:
The main aims of the project are:
1) To examine the potential effects of whey permeate as an ingredient in food aid. This will be done by examining the effect of whey added to CSB (super cereal corn-soya-blend) on energy intake, growth and microbiota in children with MAM
2) To develop a modified therapeutic milk for treatment of children with SAM who have diarrhea.
Three types of modified therapeutic milk with different content of lactose will be compared to a standard therapeutic milk.
3) To evaluate the extent and influence of lactose malabsorption and lactose intolerance in children with MAM and children with SAM and diarrhea.

Description:
Globally, an estimated 36 million children below 5 years suffer from moderate acute malnutrition (MAM), an estimated 19 million suffer from severe acute malnutrition (SAM) and approximately 3 million die because of undernutrition. Beside a high risk of infections and death, undernutrition leads to reduced intellectual development, increased risk of diseases later in life and reduced working capacity.
Cow's milk plays a key role in the treatment of children with acute malnutrition. Usually milk protein and milk minerals have received more attention and lactose has not been considered to have any specific importance. However, a number of effects indicate that lactose may have a beneficial impact on undernourished children. In contrast to this, many health workers are concerned of lactose intolerance in undernourished children with diarrhea. Diarrhea is a frequent and severe complication of undernutrition, and it often results in discontinuation of therapeutic milk treatment and substitution with a nutritionally inadequate treatment.
The overall aim of the project is to investigate the importance of lactose in the treatment of children with acute undernutrition by means of two clinical trials.

Trial # 1 addresses treatment of children with MAM. Specific treatment guidelines do not exist for MAM and most children are not treated at all. In places where resources are available for treatment of MAM, corn-soya-blend (CSB) is the most commonly used product. It consists of maize, soya beans, vitamins and minerals and is cooked as porridge. In this study, 200 children with MAM will be randomized to treatment with CSB + 15% whey permeate or a control group receiving standard CSB.
Whey permeate contains 85% lactose, which increases the energy density and gives a sweet flavor and thereby expectedly increases the energy intake. Permeate also contains a high amount of several minerals with a high bioavailability (calcium, potassium, magnesium and phosphorus) which are of special importance for growth. Permeate is less expensive than other milk products which makes it interesting in the treatment of MAM. The effect of the intervention is measured by the energy intake and growth of the children. Lactose malabsorption and lactose intolerance are measured at the initiation and termination of the study to determine the incidence of lactose malabsorption and lactose intolerance in a population of children with MAM and to investigate if the intake of moderate amounts of lactose for a certain period of time can

stimulate production of the enzyme lactase which hydrolyzes lactose and/or influence the colonic microbiota and thereby improve lactose digestion and induce tolerance.

Trial # 2 investigates if children admitted with SAM will benefit from rice based therapeutic milk if they develop diarrhea. WHO guidelines regarding treatment of hospitalized children with SAM prescribe initial nutritional treatment with therapeutic milk F-75. Many children with SAM have diarrhea and often the diarrhea aggravates when they start nutritional therapy with F-75. The etiology of diarrhea is rarely examined but is often considered to be lactose intolerance. It is far from certain that lactose is having a negative influence. Eg. choice of carbohydrate other than lactose may also have a negative impact. Rice flour is suggested to reduce diarrhea. The children will be randomized to receive one of four treatments: Rice based F-75 with low or standard lactose level and maltodextrin based F-75 with low or standard lactose level. Duration of diarrhea, lactose malabsorption and lactose intolerance will be the primary outcomes. All the products contain milk or whey protein. The studies will be conducted in a large well-functioning nutritional unit at Mulago University Hospital, Kampala, Uganda, with which we have collaborated the last two years.