

Nutrition Rehabilitation Unit at ICDDR,B

An ideal home for treatment of children with severe malnutrition

In many parts of the world, HIV/AIDS is killing millions of its victims by suppressing their immune system, making them vulnerable to repeated infections. Eventually, they succumb to one of these infections. In Bangladesh, infection with HIV/AIDS is fortunately still quite rare, but we have an equally dangerous condition leading to immunosuppression, repeated infections, and all too often, death. This condition is not AIDS, rather malnutrition, but unlike AIDS, malnutrition is easily treated and can be cured, not just controlled.

In partnership with the World Health Organization, nutrition researchers at ICDDR,B have developed and implemented a standardized treatment protocol for severely-malnourished children. The protocol is based on the incorporation of the "best practices" derived from evidence-based reasoning and decades of experience on the management of severe malnutrition of childhood. Implementation of the protocol in the ICDDR,B's Dhaka hospital reduced mortality among severely-malnourished children by more than 75%. Publication of results from the Centre in *The Lancet* demonstrated for the first time that the number of deaths can be substantially reduced among severely-malnourished children with acute illnesses, including diarrhoea, pneumonia, and septicaemia by following a prescriptive treatment protocol.

In South Asia, the death rate among hospitalized children with severe malnutrition is still very high (around 20%). The treatment of the severely-malnourished children is basically accomplished in three phases: the acute phase during which the child is stabilized and death is prevented, the nutritional rehabilitation phase which aims at achieving catch-up weight gain that the child has already lost, and the follow-up phase which prevents relapse into severe malnutrition

and promotes further growth and development.

Research done at ICDDR,B has shown that severely-malnourished children are more likely to die after discharge from hospital following successful treatment of acute illnesses, including diarrhoea and pneumonia. To prevent such deaths, the nutritional status of these children has to be improved through an appropriate and sustainable nutritional rehabilitation programme. This is done in the Nutrition Rehabilitation Unit (NRU) in the Dhaka hospital of ICDDR,B. Milk-based diets are ideal for nutritional rehabilitation but milk is not readily available in many places and is expensive. Therefore, a standardized diet protocol was developed in the NRU for rapid catch-up growth during nutritional rehabilitation using low-cost, culturally-appropriate and nutritious food based on locally-available ingredients. Essential micronutrients needed for the growth and development of the severely-malnourished children are also provided.

Most importantly, the mothers or other caretakers staying with the children in the NRU are given health and nutrition education. They are advised on the correct child-rearing practices and preparation of diets used in the standardized protocol. The diets used in the standardized protocol include *khichuri*, *halwa*, and *milk suji*.

Khichuri, a low-cost, nutritious food, is prepared from rice, lentils (*dal*), green leafy vegetables, and soybean oil. Each gramme gives one kilocalorie of energy. *Halwa*, another low-cost, nutritious diet, is prepared from wheat-flour, lentils, molasses, and soybean oil. This is more



Ingredients of khichuri

energy-dense, each gramme contributing about two kilocalories. *Milk suji*, unlike *khichuri* and *halwa*, is a liquid diet prepared from rice-powder, milk-powder, soybean oil, and sugar. During nutritional rehabilitation, the amount of *milk suji* is



Ingredients of halwa

gradually decreased while that of *khichuri* and *halwa* is increased. Recipes of *khichuri* and *halwa* are presented in the tables, and that of *milk suji* is as follows:

Ingredients of Milk Suji: Whole milk powder 40 g, Rice powder 40 g, Sugar 25 mg, Soybean oil 25 g, Magnesium chloride 0.5 g, Potassium chloride 1.0 g, Calcium lactate 2.0 g, Cooked volume 1.0 L, Energy 67 kcal/100 mL, Protein 1.4 g/100 mL

Preparation: Place all ingredients in a clean, dry saucepan, and mix thoroughly.

Ingredients of khichuri

Ingredient	Amount	Energy (kcal)	Protein (g)
Rice	4 ounces (120 g)	415	8
Lentils (<i>mashur dal</i>)	2 ounces (60 g)	206	15.6
Soybean oil	2 ounces (70 mL)	630	-
Potatoes	4 ounces (100 g)	97	1.6
Pumpkin	4 ounces (100 g)	25	1.4
Leafy vegetable (<i>shak</i>)	3 ounces (80 g)	22	2
Onions (2 medium size)	2 ounces (50 g)	25	-
Spices (ginger, garlic, turmeric, coriander powder) to taste	50 g	22	1
Water	2 pints (1,000 mL)	-	-
Total weight of <i>khichuri</i>	1,000 g	-	-
Total energy and protein per kg	-	1,442	29.6

100 g of *khichuri* contains about 145 kcal energy and 3 g protein. One cup (130 g) of *khichuri* contains 190 kcal energy and 4 g protein.

Preparation: Place the rice, *dal*, oil, spices, and water in a pot and boil. After about 20 minutes, add the potatoes, pumpkin (cut into pieces), and spices. Just 5 minutes before the rice is cooked, add the cleaned and chopped leafy vegetable. Keep the pot covered during cooking. It takes about 50 minutes to cook *khichuri*. *Khichuri* and *halwa* can be kept at room temperature for 6-8 hours.

thereby preventing them from becoming malnourished. The rate of weight gain—an indicator of the progress of nutritional rehabilitation—is comparable with that of children solely fed milk-based diets and is, on an average, 12 grammes per kg of body-weight per day.

The NRU accommodates only 18 very severely-malnourished children. Children with less severe malnutrition and children who have been released from the NRU are advised to attend the Nutrition Follow-up Unit (NFU). While these children are enrolled in the NFU until they achieve a satisfactory body-weight, their growth and development are promoted through periodic assessment of nutritional status, micro-nutrient supplementation, and counselling to mothers or other caretakers on the general condition of their children, health and nutrition interrelation, and immunization.

Add about 900 millilitres of water to the saucepan and again mix thoroughly. Cook the mixture stirring frequently with a spoon, and allow to boil for one minute. Allow to cool down and then measure with a measuring flask. If the volume is more than one litre, heat it again. If it is less than a litre, add water to make up to litre. See tables for recipes of *khichuri* and *halwa*.

A severely-malnourished child is released from the NRU when s/he has achieved the desired weight, no longer has oedema of the feet, and the mother is found to be capable of taking care of the child and preparing the diets. This usually takes about two weeks. By this time, the child is almost entirely on *khichuri* and *halwa*—diets that can be prepared and continued at home. Another advantage of these local diets is that these can also be fed to the siblings,



One of the many sessions of nutrition counselling in the Dhaka hospital of ICDDR,B

The NRU is an excellent platform not only for childcare but also for training and research. Health professionals from within the country and abroad come to the NRU for hands-on training on the management of severe malnutrition. The training programme is closely coordi-

nated with the training modules of the World Health Organization. Staff members of ICDDR,B have been actively involved in training courses in Bhutan, Afghanistan, Uganda, Cambodia, and Sweden for doctors who intend to be involved with humanitarian activities in

Africa and other regions of the world where childhood malnutrition is widely prevalent. The NRU is currently the centre for research on further simplifying the management of severe malnutrition and diagnosis and treatment of childhood tuberculosis.

Ingredients of *halwa*

Ingredient	Amount	Energy (kcal)	Protein (g)
Wheat flour (<i>atta</i>)	7 ounces (200 g)	682	24
Lentils (<i>mashur dal</i>)	4 ounces (100 g)	343	26
Soybean oil	3 ounces (100 mL)	900	-
Molasses (brown sugar or <i>gur</i>)	4 ounces (125 g)	479	0.5
Water	600 mL (to make a thick paste)	-	-
Total weight of <i>halwa</i>	1,000 g	-	-
Total energy and protein per kg	-	2,404	50.5

100 g of cooked *halwa* contains 240 kcal energy and 5 g protein. One cup (130 g) of cooked *halwa* contains 312 kcal energy and 6.5 g protein.

Preparation: Soak *dal* in water for 30 minutes and then mash. Fry *atta* in a hot pan for a few minutes. Mix *atta*, mashed *dal*, and oil with water. Melt *gur* and add to the mixture to make a thick *halwa*.

A Case History

Sheema's mother died of childbirth complications soon after she was born. Her father re-married, and thereafter her aunt started to look after her. Lack of proper care and repeated bouts of diarrhoea made her malnourished. When she was 2 years old, she became very ill and was admitted by her aunt to the Dhaka hospital of ICDDR,B. She was suffering from profound malnutrition, pneumonia, and diarrhoea. As soon as her pneumonia and diarrhoea improved, Sheema was placed in the Nutrition Rehabilitation Unit where nutritional rehabilitation was started using local, low-cost diets. She recovered from the state of acute malnutrition and was discharged after five weeks. Her aunt was responsive to the health and nutrition education provided to her while she stayed with Sheema in the NRU. She diligently brought Sheema to the Nutrition Follow-up Unit, which proved to be rewarding. At the end of follow-up for further 5 months, Sheema was a normal, healthy child.

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