Infectious Diseases and Nutrition

Summary

- **Infectious diseases and malnutrition, including protein, energy, and micronutrient deficiency, are closely interrelated, often leading to a vicious circle.**
- **Such a vicious circle is likely to occur in children, pregnant/nursing women, elderly people, people in emergency/displaced situations, people suffering from chronic infections (tuberculosis, HIV, etc.) or inpatients.**
- **It is recommended to select suitable measures according to the latest recommendations and guidelines of WHO on individual infectious diseases, because the evidence on nutrition and intervention are still limited and being accumulated day-to-day.**

Overview

- Infectious diseases and malnutrition are always closely related, and they cause a vicious circle, making each other even worse, leading to the spread of infectious diseases, increasing the burden to government health expenditure and patient's out-of-pocket expenses (Figure1). Various immune functions are weakened in malnourished states, so the risk of infection and increased severity tends to be higher, and treatment period is often prolonged. Complications are also likely to occur. On the contrary, many infectious diseases cause reduced appetite and indigestion, making people with moderate malnutrition suffer more severe malnutrition, and thus susceptible to new infections.
- Such a vicious circle is likely to occur in children, pregnant/nursing women, elderly people, people in emergency situations such as conflicts or disasters, people suffering from chronic infections, or inpatients. Tuberculosis (TB) patients and people with HIV are highly undernourished which may accelerate disease progression. Therefore, nutrition assessment, counselling, and care and support programs are needed for patients with active TB or HIV infection. Parasitic diseases, such as soil-transmitted helminths, especially Trichuris trichiura, cause loss of appetite and diarrhea, leading to malnutrition. Therefore, parasitic disease control is recognized as an important basic element for nutritional improvement.
- Forty-four percent of causes of death of children under 5 years of age is still infectious disease[1], while 45% is undernutrition[2]. Diarrhea, measles and pneumonia account for more than half of deaths of children under 5 from infectious diseases, and the frequency and treatment period of those tend to increase due to malnutrition[2]. Severe infectious diseases in early childhood can cause acute wasting and have long-term effects on linear growth[2].
- Declining resistance to infectious diseases may be caused by general malnutrition (protein energy malnutrition (PEM)) or micronutrient deficiency. Some micronutrients, such as zinc and vitamin A, play an important role in maintaining the immune system and affect the susceptibility to infectious diseases.
- Effective and safe nutritional support vary depending on infectious diseases, age, and nutritional status, etc. It is recommended to select suitable measures according to the latest recommendations and guidelines of WHO on individual infectious diseases, such as dietary consultation for appropriate intake of major nutrients, intensive nutritional supplementation (ready to use therapeutic food (RUTF), etc.), and specific micronutrient supplementation. WHO continuously accumulates evidence on nutrition and intervention and compiles it in the guideline based on a systematic review (eLENA[3]).

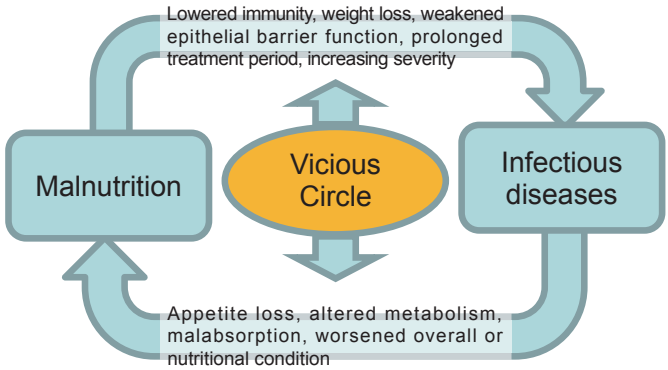


Figure 1: Vicious circle of malnutrition and infectious diseases

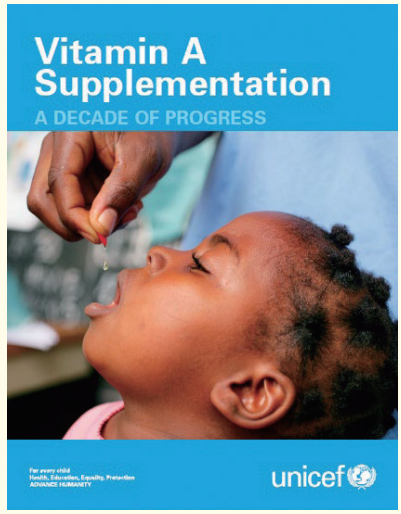
1: Global Health Estimates 2016: YLLs by age, sex and cause
2: Black RE, et al. Lancet 2013, 382: 427-512
3: http://www.who.int/elena/en/

Cases

[Vitamin A supplements (for prevention and at acute stage of measles)]

Vitamin A is an essential nutrient for the immune function. 190 million children per year fall into vitamin A deficiency, and in severe cases, the risk of visual impairment (night blindness), measles, diarrhea and so forth increases and it may lead to death (about 6% of deaths of children under 5 years in Africa, 8% in Southeast Asia)[4]. Although the mechanism by which vitamin A supplementation reduces mortality is not fully understood, when vitamin A supplements are given to children aged 6 to 59 months who are at risk for vitamin A deficiency, past studies indicate that the mortality risk in general or due to diarrhea is reduced by 12%[5]. WHO published "the Guideline: Vitamin A supplementation in infants and children 6-59 months of age."[4]

There is currently no effective measles treatment for children, and WHO recommends two doses of vitamin A supplements, given 24 hours apart to all children diagnosed with measles. Although measles with malnutrition, especially vitamin A deficiency, leads to 3-6% deaths in poor health service settings, vitamin A supplements have been shown to reduce the number of deaths from measles by 50%.



Vitamin A Supplementation to a child (UNICEF)

[Management of acute-severe malnutrition of active TB patients]

Malnutrition increases the risk of TB. For example, the lower the BMI, the higher the risk of TB[6]. Furthermore, in TB patients, malnutrition due to weight loss, PEM, and micronutrient deficiency is common (Figure 2). In particular, children and pregnant women are susceptible to malnutrition and TB. People with TB are often unable to work or give up work, resulting in a significant loss of earning, and often lose appetite, resulting in further malnutrition and more severe TB, and the development of complications. These two factors often cause a negative spiral of poverty. The WHO survey reported that securing necessary additional food or nutrition is a big barrier in the continuation of TB treatment (Figure 3)[7]. For this reason, traditionally, free food supply to patients and families has been conducted, and WHO published "the Nutritional care and support for patients with tuberculosis guideline"[6] in 2013.

The guideline provides detailed recommendations on countermeasures by (1) the diagnosis result of TB (active or not, multidrug resistance, etc.), (2) the patient classification (age, pregnant/nursing women, etc.), and (3) nutritional status. Furthermore, considering the interaction of malnutrition and TB, some strong recommendations are given:

1) All individuals with active TB should receive (i) an assessment of nutritional status and (ii) appropriate counselling based on their nutritional status at diagnosis and throughout treatment;
2) Closer nutritional monitoring and earlier initiation of nutrition support (before the first 2 months of TB treatment are completed) should be considered in cases of severe acute malnutrition;
3) Clinical and nutrition assessment of the causes of undernutrition is needed in cases of weight loss or failure to gain weight, in order to determine the most appropriate interventions;
4) Wider socioeconomic issues should be addressed because poverty and food insecurity are both causes and consequences of TB; and
5) Nutritional implications on complications should be fully considered during nutrition screening, assessment and counselling.

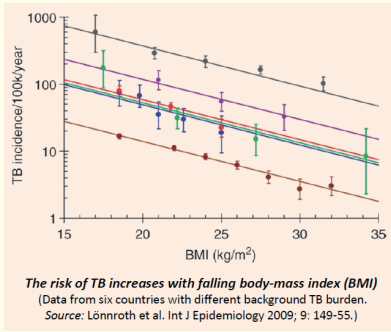


Figure 2: BMI and risk of TB incidence[6]

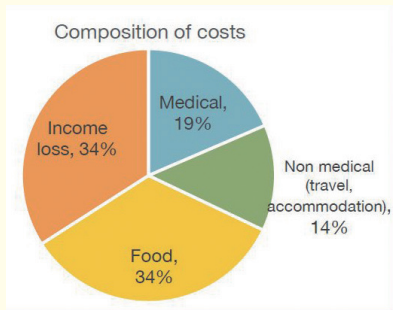


Figure 3: Out-of-pocket payment of TB patients in Ghana (WHO survey)[7]

4: Guideline: Vitamin A supplementation in infants and children 6–59 months of age. 2013. WHO
http://apps.who.int/iris/bitstream/handle/10665/44664/9789241501767_eng.pdf?sequence=1
5: Imdad A, Mayo Wilson E, Herzer K, Bhutta ZA. Vitamin A supplementation for preventing morbidity and mortality in children from six months to five years of age. Cochrane Database of Systematic Reviews 2017, Issue 3. Art. No.: CD008524. DOI: 10.1002/14651858.CD008524.pub3.
6: An assessment of the economic burden incurred by TB patients and their households in Ghana (Technical Brief). May 2018
7: WHO guideline: Nutritional care and support for patients with tuberculosis (2013)
http://www.who.int/nutrition/publications/guidelines/nutcare_support_patients_with_tb/en/

Human Development Department
E-mail: hmge1@jica.go.jp
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