

Research on Malnutrition in AIDS Patients

Lyu Xi¹, Cai Qian², Zeng Siyi¹, Xin Yafei², Zhao Jianrong²

1.College of Nursing, Dali University, Dali 671013, China

2.Yunnan Provincial Hospital of Infectious Diseases, Kunming 650399, China

Abstract: Malnutrition is a major factor influencing the prognosis and quality of life of AIDS patients, and screening, assessment, diagnosis, intervention, nutrition monitoring of patients with AIDS should be done as early as possible. AIDS patients suffer from malnutrition as a result of impaired immune function brought on by the ongoing invasion of HIV, and malnutrition and impaired immune function are causal of each other, affecting each other to form a vicious circle. In order to further avoid malnutrition, slow the progression of the disease, and enhance quality of life, this article examines the primary causes of malnutrition in AIDS patients as well as the nutritional programs for various AIDS patients.

Keywords: HIV/AIDS; Malnutrition; Nutrition

Acquired immunodeficiency syndrome (AIDS) has emerged as one of the most significant public health concerns since the first case was identified worldwide in 1981. According to UNAIDS, there will be 39.9 million HIV-positive individuals globally by 2023, with 1.3 million new infections^[1], 719,464 HIV-positive individuals in their lifetime, and 570,236 AIDS patients in China^[2]. The widespread use of highly active antiretroviral therapy (HAART) has reduced the prevalence of HIV-related illnesses, postponed the progression of the disease, and improved patient quality of life over time^[3]. However, several studies have found that malnutrition exists to varying degrees in most HIV/AIDS patients, whether adults, children, or adolescents^[4-6], and malnutrition has become one of the major factors affecting the quality of survival of AIDS patients. In this paper, we will explore both the main causes of malnutrition in AIDS patients and nutritional programs for different infected patients.

1. Main causes of malnutrition in AIDS patients

1.1 Impaired immune function

The most significant target cells for HIV infection are CD4⁺T lymphocytes^[7], and the gradual decline in CD4⁺T lymphocytes throughout the HIV infection process results in a significant impairment of cellular immune function. The nutritional status of the organism is closely linked to immune function, and the impairment of immune function causes malnutrition, which in turn weakens the immune function of the organism, creating a vicious cycle^[8]. Furthermore, opportunistic infections are more likely to occur in HIV/AIDS patients who are malnourished, and managing opportunistic infections is a major cause of death for AIDS patients^[9]. Thus, the interaction between HIV infection and malnutrition makes the disease more severe the longer it lasts.

1.2 Inadequate nutritional intake

The most common herpesvirus infection in patients with HIV/AIDS is cytomegalovirus infection, which attacks the digestive system, central nervous system, and other organs and systems. When cytomegalovirus causes esophagitis or enterocolitis, it frequently manifests as dysphagia, swallowing pain, abdominal pain, and diarrhea, which results in impaired nutrient intake^[7]. At the same time, patients with HIV/AIDS have a lower immune system and long-term use of antibiotics and other medications, which can easily lead to flora imbalance and the mass reproduction of *Candida albicans*. As a result, oral *Candida* infection is also a common fungal infection in AIDS patients, the clinical manifestations of the lesion at the bleeding, accompanied by intense pain, seriously affecting the eating^[10]. Malnutrition symptoms are more noticeable in AIDS patients with critical illness due to intestinal flora dysbiosis, which directly affects digestion. Additionally, the incidence of feeding intolerance during the feeding process is significantly higher than in normal patients with critical illness^[11], and feeding is fre-

quently delayed or stopped, which impacts the target calorie attainment^[12].

1.3 Digestive and absorption disorders

The intestinal tract, as the main target organ of HIV infection, is impaired by decreased CD4+T lymphocytes that damage the intestinal epithelial cell barrier, and pathological changes such as congestion, edema, and ulceration occur in the intestinal mucosa, with an increase in intestinal permeability and an increase in inflammatory factors^[13], and HIV/AIDS patients are prone to symptoms of gastrointestinal intolerance, such as abdominal bloating, diarrhea, vomiting, aspiration, and gastric retention, at the early stage of the infection. Despite significant HIV viral suppression, CD4+T-cell recovery, and reduction of systemic inflammatory response after HAART, intestinal mucosal biological, physical, and immune barrier damage remains^[14], and patients often experience weight loss, malabsorption, and cachexia.

2. Nutrition Initiatives for Various AIDS Persons

2.1 Critically ill infected persons

Malnutrition is particularly prominent in critically ill patients due to the increased metabolic rate and weight loss in the body that is continuously under severe stress^[15]. Nutritional guidelines issued by the European Society of Clinical Nutrition and Metabolism recommend^[18] that nutritional therapy should be initiated as early as possible in critically ill patients within 48h of hospital admission, with preference given to patients who are able to eat, and that if oral feeding is not possible, enteral nutrition (EN) should be carried out at an early stage. Parenteral nutrition (PN) should be initiated when there are contraindications to EN or when more than 70% of the nutritional requirements cannot be met within 3-7d. Within 72h of the start of nutritional therapy, 70%-100% of resting energy consumption was gradually achieved to avoid undernutrition and overnutrition. The application of EN in HIV/AIDS patients has been found to be effective in protecting the immune barrier^[19], reducing the incidence of gastrointestinal complications in mechanically ventilated patients, and improving feeding compliance^[20]. Overall nutritional therapy should be initiated as early as possible after admission of critically ill HIV/AIDS patients in order to maximize nutritional status and promote prognosis.

2.2 Children and adolescents infected

In order to sustain normal growth and development and to be healthy, children and adolescents need to consume more energy than adults^[21]. It has been discovered that children with HIV are more likely than children without HIV to experience growth retardation, low body mass index, and wasting^[22]. When combined with peak growth and development, HIV infection alters children's and teenagers' metabolic activity, which raises their energy requirements. The Nutritional Guidance Manual for Children with AIDS recommends that children and adolescents be directed toward a healthy diet^[23], starting children's diets as early as possible to ensure food diversity; rice, potatoes, and other starchy foods as the staple food, more fresh dark-colored vegetables and fruits to supplement vitamins and minerals, moderate intake of fish, meat, eggs, and milk, frequent consumption of beans and nuts. Five to six meals a day are advised in order to prevent excessive food damage to the stomach. There have also been reports of micronutrient deficits in children and adolescents living with HIV^[21]. They can be supplemented with vitamins B, vitamin C, and vitamin E to protect oral and gastrointestinal epithelial cells and to increase CD4+T-cell and CD8+T-cell counts; vitamin D supplementation to promote calcium absorption; and zinc supplementation to reduce the incidence of diarrhea^[24].

2.3 Tuberculosis infected persons

Tuberculosis is one of the most common opportunistic infections and an important cause of death in AIDS patients^[25]. Studies have reported^[26,27] that 67.7% of patients with HIV combined with pulmonary complications such as tuberculosis and pneumonia are at nutritional risk. This could be because patients who are co-infected with HIV and TB not only experience HIV-induced immune cell destruction, but also experience a further decline in immunity during anti-tuberculosis treatment, which results in a continuous decrease in CD4+T-cells, worsening the condition and raising nutritional risk. Therefore, daily nutritional intake should be emphasized. The recommended target energy re-

quirement is 35–40 kcal/(kg-d), with 45%–65% of total energy coming from carbohydrate intake, 25%–35% from fat intake, and 15%–30% from protein intake^[28]. Eat light, easily digested foods and a moderate amount of fresh fruits and vegetables each day, and stay away from cold, raw, and greasy foods. Steer clear of cold and raw food; and use rich cooking techniques including boiling, steaming, stewing, and simmering^[29].

In summary, the high incidence of malnutrition in HIV/AIDS patients has continuously formed a vicious circle with the impairment of immune function, leading to prolonged disease duration and serious impact on patients' quality of life. According to the five-tiered malnutrition treatment paradigm, it is critical to create individualized nutrition programs for individuals of all ages and with various AIDS comorbidities. At present, the specific nutritional requirements and interventions for different infected groups of HIV/AIDS patients in China are not comprehensive enough, and research in this area should be strengthened in the future, so as to provide a scientific basis for the nutritional intake and disease recovery of HIV/AIDS patients.

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