Narrative Review

Nutrition Requirements and Nutrition Intervention for People Living with HIV/AIDS (Adults)

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Abstract

Nutrition plays a crucial role in the overall health and well-being of people living with human immunodeficiency virus (HIV). This review aims to provide a current summary of the macronutrient and micronutrient requirements for HIV-positive individuals. The author emphasizes the fundamentals of nutrition treatment as a guide for medical professionals to adopt the right strategy based on risk-adapted nutrition therapy. The majority of nutrition guidelines were published over 10 years ago and have failed to address the protein requirements for people with human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS). Proper nutrition can reduce the risk of malnutrition, infections, and other complications, while also assisting with symptom management, maintaining a healthy weight, and improving immune function. In this review, the author has identified the latest reliable and validated nutrition screening tool specifically designed for people with HIV/AIDS, along with a risk-stratified nutrition therapy based on the screening tool to facilitate the nutrition care process. People living with HIV/AIDS have unique nutritional needs due to the virus's impact on the body's immune system, metabolism, and nutrient absorption. It is important for them to work with a healthcare professional, namely a dietitian, to assess nutrition risk and develop an individualized dietary intervention for a healthy lifestyle.

Keywords
- HIV
- AIDS
- nutrition
- dietary guidelines

Introduction

The global prevalence of human immunodeficiency virus (HIV) remains a significant public health concern. According to the Joint United Nations Program on HIV/AIDS, as of 2021, approximately 38.4 million people were living with HIV worldwide.[1] However, the prevalence of HIV is considerably higher in other regions, notably Sub-Saharan Africa, Eastern Europe, and Central Asia. Among these regions, Sub-Saharan Africa bears the greatest burden of HIV, accounting for 70% of global HIV infections in 2021.[1] It is essential to recognize that HIV prevalence is not uniform worldwide. Therefore, addressing this uneven distribution of HIV infections and ensuring access to adequate nutrition, treatment, and healthcare services in high-prevalence areas remains a paramount priority in the ongoing battle against the HIV/AIDS pandemic.

As HIV weakens the body's defenses, individuals are not only more susceptible to infections but also face challenges in maintaining proper nutrition.[2] HIV is the causative agent

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of acquired immunodeficiency syndrome (AIDS), which damages immune cells and hinders their ability to function effectively.[2] The virus can disrupt the normal absorption of nutrients in the gastrointestinal tract and increase energy expenditure, leading to weight loss and malnutrition.[3] As HIV progresses to AIDS and progressively weakens the host's defense mechanisms, infected individuals can develop severe illnesses, including malnutrition, tuberculosis, encephalopathy, severe bacterial infections, and cancers such as lymphomas and Kaposi's sarcoma.[2,4] This interplay between HIV pathology and malnutrition can create a vicious cycle, with each exacerbating the other. Therefore, addressing the nutritional needs of individuals living with the virus is essential for enhancing their overall health and quality of life.

The consumption of a well-balanced and healthy diet is essential for the health and survival of all individuals, regardless of their HIV status. A recent retrospective cohort study has revealed that malnutrition significantly accelerates the onset of infections in people living with HIV, but this can be ameliorated through appropriate nutritional interventions.[5] In fact, deficiencies in certain micronutrients such as iron, folic acid, zinc, selenium, and vitamins A, C, and D can adversely impact immune function.[6] Considering that the HIV population faces a heightened risk of malnutrition,[7,8], ensuring adequate nutrition becomes an essential component of healthcare for individuals living with HIV.

Malnutrition and HIV are strongly related; HIV can induce or exacerbate malnutrition as a result of inadequate energy intake, nutrient malabsorption, and increased energy requirement.[3,6] Malnutrition leads to weight loss, muscle wasting, nutrients deficiencies and then impairs the immune system.[9] This cascade effect establishes a vicious cycle that might expedite the progression from HIV infection to AIDS,[10] thereby increasing the risk of mortality.[6] Implementing proper nutrition interventions, such as supplementing specific nutrients to counter malnutrition problems, is crucial for sustaining the nutritional status and overall health outcomes of individuals living with HIV.[11,12]

Despite advancement in HIV prevention and treatment, which have turned HIV infection into a manageable chronic health condition, the nutrition needs for people acquired with HIV remain incomplete. This article aims to provide an informative overview of some essential dietary requirements to facilitate optimal nutritional intake among those living with HIV/AIDS. By addressing these nutritional considerations, we can contribute to improving the overall health and well-being of individuals coping with HIV infection.

Nutrition Guidelines

Irrespective of HIV status, prioritizing healthy eating is crucial. A widely accepted guideline for achieving a balanced diet is the "MyPlate" model, which recommends allocating half of the plate to fruits and vegetables, one-quarter to whole grains, and one-quarter to lean proteins, legumes, or nuts.[13] Additionally, the MyPlate model advocates for incorporating a serving of low-fat dairy on the side.[13] It is important to note that MyPlate emphasizes the consumption of minimally processed fruits and vegetables, excluding fruit juice, as one of its specific recommendations.[13] Such approach to nutrition can benefit individuals regardless of their HIV status, promoting overall health and well-being.

Another valuable guideline is the "Healthy Eating Plate" developed by the Harvard T.H. Chan School of Public Health, which emphasizes the importance of choosing healthy fats and avoiding highly processed foods and sugary drinks.[14] Additionally, the Healthy Eating Plate underscores the significance of maintaining physical activity throughout the day to aid in weight management.[14] Both "MyPlate" and "Healthy Eating Plate" models should be used as a guide in creating healthy and balanced meal to support overall health and well-being regardless of one's HIV status.

The topic of dietary guidelines specifically tailored for individuals living with HIV is not included in the 2020 to 2025 Dietary Guidelines for Americans and the Malaysia Dietary Guidelines 2020. However, it is advisable for individuals with HIV to adhere to evidence-based dietary guidelines that support a healthy lifestyle. It is important to understand that nutrients and foods do not act in isolation, and there is no single "magic bullet" that can cure or eliminate HIV. As emphasized by the dietary guidelines,[15,16] the focus has shifted toward dietary patterns that are applicable regardless of age, race, ethnicity, economic status, or health status. This strategy recognizes that a holistic approach to nutrition benefits everyone.

Specific Nutrition Guidelines

Energy Requirement

Energy is essential for maintaining a healthy body weight and lean body mass, and its reduction can have detrimental effects on HIV patients, leading to a poor prognosis.[17] Inadequate energy intake can be triggered by various factors, including oral candidiasis, infections leading to a diminished appetite, side effects of antiretroviral medications (e.g., nausea, vomiting, diarrhea), metabolic repercussions of malnutrition, and psychosocial factors like a lack of emotional support.[18] The energy requirements for people living with HIV depend on several variables, including their weight, age, sex, level of physical activity, and overall health status. It is crucial to tailor dietary recommendations to individuals' unique circumstances to ensure they receive sufficient energy for their specific needs. In general, it is recognized that the resting energy expenditure in adults with untreated asymptomatic HIV is approximately 10% higher than that in individuals without HIV.[19] The same holds true for asymptomatic adults receiving antiretroviral therapy, as well as those dealing with HIV wasting and secondary infections.[15] For symptomatic HIV and later stage of AIDS, it is estimated that the energy requirements would increase by approximately 20 to 30% to maintain healthy body weight.[20]

Based on current data, here are some general guidelines for estimating energy requirements for HIV-positive patients: For individuals with HIV without significant weight loss, the energy requirement is typically around 30 to 35 kcal/kg of body weight per day. On the other hand, for

individuals with HIV who have experienced significant weight loss or wasting, the energy requirement may be as high as 40 to 45 kcal/kg of body weight per day. However, in severe malnourished cases in critical setting that involve refeeding syndrome, defined by a group of electrolytic changes associated with metabolic abnormalities that can occur as a result of reintroduction of nutritional support (oral, enteral, or parenteral),[21] certain management guidelines, such as those provided by the American Society for Parenteral and Enteral Nutrition Consensus Recommendations for Refeeding Syndrome or National Institute for Health and Care Excellence guideline CG32, should be followed.[21,22]

Protein Requirement

The immune system of an HIV-positive person becomes compromised, particularly during the later stages of the disease, leading to a clinical state of protein deficiency that necessitates higher protein intake to support the weakened immune system.[23,24] However, according to the Academy of Nutrition and Dietetics and the World Health Organization (WHO), there is currently insufficient data to conclusively recommend an increase in protein intake for people with HIV.[20,25] They suggest that protein intake should be personalized, aiming for around 15% of total energy intake.[20]

However, certain professionals recommend protein requirements of 1.0 to 1.4 g per ideal body weight kilogram (g/kg) for maintenance and 1.5 to 2.0 g/kg for anabolism.[26] According to the European Society for Clinical Nutrition and Metabolism (ESPEN) guidelines on enteral nutrition for wasting in HIV and other chronic infectious diseases, it is outlined that the target protein intake should be 1.2 g/kg of body weight per day during stable phases of the disease, and this may be increased to 1.5 g/kg of body weight per day during acute illness.[27] There is no doubt that individuals with HIV/AIDS require increased protein and micronutrient intake to support their weakened immune system.

Taking all factors into account, the author aims to suggest protein intake recommendations within the range of 1.0 to 1.2 g per kilogram per day (g/kg/day) for maintenance purposes. To address the additional demands of physiological stress, such as infections, a slightly higher intake of 1.3 to 1.5 g/kg/day is suggested. However, when dealing with acute illness and situations requiring enhanced anabolism, protein intake exceeding 1.5 g/kg/day is recommended. Furthermore, it is important to note that the distribution of high-quality protein should be spread evenly throughout the day to optimize muscle maintenance.[28] This approach to protein intake takes into consideration the varying needs of individuals, especially those with HIV/AIDS, as they navigate different phases of health and wellness.

Fat Requirement

There is no special fat requirement being reported for HIV population except for those who are experiencing side effects of antiretroviral therapy such as diarrhea. Optimal intake of fat (25–30% of total energy) is recommended to maintain optimal health. In line with the latest dietary guidelines, it is advisable for individuals to reduce their saturated fat intake as part of a personalized healthy dietary pattern, as this reduction has been associated with decreased levels of total cholesterol, low-density lipoprotein (LDL) cholesterol, and a lower risk of cardiovascular disease events.[29] A diet rich in monounsaturated and polyunsaturated fats, found in sources like nuts, seeds, fish, and vegetable oils, is generally considered healthier and can help lower LDL cholesterol levels.[30] The American Heart Association further recommends that adults aim to consume less than 5 to 6% of their total daily energy intake from saturated fats and should avoid trans fats.[31] These dietary choices can contribute to improved cardiovascular health, which is especially important for individuals with HIV/AIDS, as they may be at increased risk for certain cardiovascular complications.

Micronutrient's Requirements

In addition to macronutrients intake, people living with HIV/AIDS also require attention on the intake of essential micronutrients to boost their immune function and overall health. A diet that provides sufficient micronutrients to meet the recommended dietary allowance (RDA) should be encouraged. If it is anticipated that dietary intake may be insufficient, a daily multivitamin and mineral supplement at levels providing 100% of the RDA can be beneficial.[26] These recommendations align with the guidelines set forth by the WHO in 2003,[20] and the review article published by Forrester and Sztam in 2011.[32]

The use of herbs and dietary supplements is widespread among people living with HIV.[33,34] There is a risk of possible interactions between selected dietary supplements with the antiretroviral medicines that may result in decrease in the therapeutic effect of the medicines and increased risk of viral resistance.[35] Furthermore, there is no evidence to suggest that higher levels of supplementation lead to improved outcomes for HIV in adults.[36] Regarding complementary and alternative medicine (CAM), there is currently a lack of robust scientific literature to establish its safety and efficacy for people living with HIV.[37] In light of these uncertainties and potential risks, it is crucial for patients to consult their healthcare provider[34] or dietitian before considering any supplements or CAM interventions to ensure safety and to make informed decisions regarding their nutrition intervention regimen.

Sample Menu

Overall, for people living with HIV, the diet should be individualized based on a thorough nutrition assessment by a professional. ►**Table 1** provides a suggested balanced sample menu for people living with HIV, providing the right amount of nutrients for good health.

Nutrition Intervention

As part of nutrition care process, nutrition screening is the process of identifying patients or clients who may have a nutrition diagnosis and benefit from nutrition assessment and intervention by a dietitian.[38] While numerous

Table 1 Sample 1-Day Meal Plan

	1,600 kcal/day	1,800 kcal/day	2,000 kcal/day
Breakfast	• Egg sandwich—2 slices (1 egg) • Butter—1 tsp • Coffee with fat-free milk—1 cup	• Egg sandwich—3 slices • Mayonnaise—1 tsp • Masala chai—1 cup	• Fried noodles—2 cups • Minced chicken—½ piece • Fat-free milk—1 cup
Morning snack	(None)	• Boiled chickpea chaat—½ cup • Jaggery—1cup	• Masala potato bites (Kenya-inspired)—3/4 cup • Roasted chana flour (besan)—1 cup
Lunch	• Rice—1 Chinese bowl • Chicken curry cooked with dhal—1 piece • Mixed vegetables (boiled)—1 cup • Papaya—1 slice • Jaggery—1 cup	• Rice—1 Chinese bowl • Mixed vegetables dhal—1 cup • Chicken in black pepper sauce (Ayam sos lada hitam)—1 piece • Watermelon—1 slice • Plain water—1 cup	• Rice—1 Chinese bowl • Tandoori Tofu skewers—1 piece tofu • Stir-fried mixed vegetable—1 cup • Pear—1 piece • Plain water—1 cup
Afternoon snack	• Whole wheat crackers—4 pieces • Sattu drink—1 cup	• Kaya toast—2 pieces • Scrambled egg—1 • Energy drink—1 cup	• Cream crackers—6 pieces • Deviled egg/soft-boiled egg—1 whole • Energy drink—1 cup
Dinner	• Rice—1 Chinese bowl • Fish cooked in black pepper sauce—1 whole • Stir-fried vegetables—1 cup • Orange—1 whole • Plain water—1 cup	• Rice—1 Chinese bowl • Mixed vegetables (boiled)—1 cup • Spicy tamarind fish (Ikan masak asam pedas)—1 whole • Papaya—1 slice • Plain water—1 cup	• Rice—1 Chinese bowl • Mackerel in low-fat coconut milk—½ whole • Hard-boiled eggs—1 whole • Vegetable soup—1 cup • Apple—1 whole • Plain water—1 cup
Supper	• Plain bun—1 medium size • Fat-free milk—1 cup	• Ragi porridge—1 cup • Fat-free milk—1 cup	• Roasted nuts—½ cup • Fat-free milk—1 cup

Macronutrient distribution: 55% carbohydrate, 20% protein, 25% fat of total energy.

malnutrition screening tools exist, only one specific nutrition screening tool has been developed by registered dietitians in the United States for individuals living with HIV.[39] This unique tool, known as rapid nutrition screening for HIV disease (RNS-H), has undergone validation to ensure its effectiveness and accuracy in identifying nutritional concerns in this specific population.[25,39] The RNS-H tool consists of seven questions. Each item on the RNS-H tool has an assigned point value based on severity and contribution to nutritional risk. Based on the total score, an individual will be assigned to one of three nutritional status: score of 0 to 3 is defined as "low risk," 4 to 6 is defined as "at risk," and 7 to 15 is defined as "high risk."[39]

In light of the increasing demand for healthcare resources to manage HIV in certain regions, the author proposes a risk-stratified approach to nutrition intervention. This approach leverages the RNS-H tool to categorize individuals based on their level of nutritional risk, allowing for a more targeted and efficient allocation of healthcare resources. By tailoring nutrition interventions to the specific needs of each individual, healthcare providers can optimize care delivery and enhance the overall well-being of those living with HIV while also making prudent use of limited healthcare resources, particularly in regions with a high prevalence of HIV/AIDS.

Each nutrition risk group is then provided with a different level of nutrition care, based on their individual needs. Using this approach, registered dietitians will be able to identify which individuals require intensive nutrition intervention and which require minimal nutrition intervention. In the case of the low-risk group, the primary objective of nutrition care is to maintain their nutritional status. For instance, individuals in this category may receive general nutrition advice aimed at meeting their macro- and micronutrient requirements. On the other hand, those individuals who are at risk of malnutrition will undergo assessments to identify the underlying causes of their malnutrition. Subsequently, nutrition interventions will be tailored to address specific nutrition-related symptoms (e.g., nausea, vomiting, diarrhea) that impact appetite and oral intake. Conversely, high-risk individuals may necessitate more specialized nutrition interventions, such as the provision of oral nutrition supplements or enteral and parenteral nutrition support.

Regardless of risk group, all patients should receive education on personal hygiene practices and food safety to minimize the risk of infections.[40] Nutrition interventions may recommend exercise training, including resistance training, to build or maintain muscle mass[41,42]; it is important to consider that people with HIV are more susceptible to sarcopenia.[43] On the other hand, exercise training has been shown to improve immune function,[41] body composition,[41] and appetite in people living with HIV.[44] As part of HIV care, the use of broad-spectrum anthelmintics

(deworming drugs) biannually has been recommended for these individuals.[45]

Conclusion

While a well-balanced diet should be the cornerstone of any HIV nutritional plan, certain dietary supplements may assist in supporting immune function and overall health for individuals living with HIV, especially when there is inadequate intake of micronutrients. It is crucial to emphasize that dietary supplements and CAM should not serve as substitutes for a healthy diet or medical treatment. The author recognizes the importance of personalized, risk-stratified nutrition therapy in supporting nutritional status and overall health in the management of HIV nutrition. Therefore, individuals living with HIV are encouraged to collaborate with a registered dietitian or nutritionist to develop a tailored nutrition plan that considers their unique needs and goals, regardless of their HIV stage.

Author's Contribution

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Conflict of Interest

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