HIV & Nutrition during Advanced HIV Infection

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HIV / AIDS & Nutrition

- Close relationship of nutrition and immune function, opportunistic infections, progression of the disease and quality of life.
- Patients require nutrition intervention due to nutritional deficiencies, metabolic abnormalities, weight and body composition changes, and altered GI function.
- Side effects of ART necessitate medical nutrition therapy to optimize nutrition status and prevent additional health risks.

‘Decreased nutritional status in HIV-infected patients is associated with an increased mortality, independently of immunodeficiency and viral load.’
Possible Progression of HIV Infection

- Exposure to HIV
  - No Infection
  - Infection (HIV+)
    - Acute disease
    - Asymptomatic
    - Neurological
    - Opportunistic Infections: viral, bacterial, fungal, protozoan
      - Cancers:
        - Kaposi’s sarcoma
        - B cell lymphomas
  - Lymphadenopathy
  - AIDS
  - Death
Opportunistic Infections & the GIT

- Opportunistic infections → CD4+ helper T cell count <200/mm³
- The GI tract has a localized immune response that destroys antigens, mediated by localized helper T cells and IgA-producing B cells.
- HIV/AIDS → decreased localized T helper population & production of IgA.
- Microorganisms are allowed to infect the gut.
- Inflammation & the presence of immune complexes, cytotoxic cells, inflammatory cytokines and microbes result in destruction of intestinal villi, microvilli and brush border enzymes → increased gut permeability and microbial translocation.
- Organisms are allowed entry into systemic circulation, which can cause an infection.
Opportunistic Infections & the GIT

- HIV virus itself can cause direct gut injury:

- Inflammation of small bowel
- Partial villous atrophy
- Crypt Hyperplasia
- Diarrhoea (without an opportunistic infection)

AIDS Enteropathy
Diarrhoea
Decreased transit time
Malabsorption
Further compromised immune system
Free Radicals, Antioxidants & Oxidative Stress

- Constant stimulation of the immune system → increased free radical production
- ART – increase oxidative stress
- = disruption of balance between free radicals and antioxidants

Two types of antioxidants:

- **Antioxidant enzymes** (Superoxide dismutase, catalase (heme requiring enzyme) & glutathione peroxidase (selenium containing enzyme))
  - ability to work depends on availability of minerals needed as co-factor
- Iron & Copper – dual role → production and destruction of free radicals (ROS)
- **Non-enzymatic enzymes**: vitamins E and C, carotenes, glutathione (produced from cysteine, glutamate and glycine), uric acid, taurine and phytochemicals.
Glutathione

- NB antioxidant
- Protein deficiency → glutathione deficiency

Disease = Imbalance between free radicals and AO

- No AO protection = Free radicals damage cells
- Accumulated cellular damage → disease
Oxidative Stress

- Decreased levels of AO and increased levels of oxidative stress – seen in HIV pts. Reasons include:
  - ↑ in viral replication
  - Inflammation
  - Decrease in number of immune cells
  - = suppressed immune system
Antioxidants & Immune Function

- Selenium levels – reported to be low in HIV pts on ARTs
- Glutathione levels low in HIV pts
- → may be necessary to supplement glutathione to restore immune function – especially when undergoing ART
- More research required.
Recommended Daily Allowance (RDA) / Daily Reference Intakes (DRI)

- Multivitamin supplements may slow down progression of disease
- Pre-ART, multivitamin and mineral supplementation was associated with a 30% reduced risk of progression to AIDS and a 40% reduction in the risk of low CD4+ counts.

- Increased need of nutrients depends on stage of disease
  - Pts on ART with low viral load – decreased immune stimulation = reduced nutritional needs
  - Insufficient knowledge – which nutrient supplementation is beneficial in patients of ART.
    - not many studies addressing vitamin and mineral needs in patients with HIV taking antiretroviral medications
    - Zinc often seems to be deficient (♀ 36%; ♂ 40%)
    - Advanced stage HIV infection - more aggressive supplementation warranted.
    - Safe to prescribe a multivitamin
### Components of a Nutritional Assessment

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Nutritional Assessment

- Food insecurity associates with lower medication adherence, uncontrolled viral load, nutrient deficiencies, increased hospitalization, higher risk of disease progression, and high-risk behaviors that increase the risk of HIV transmission.\(^{48}\)
- Nutrient deficiencies & absence of food can reduce the effectiveness of antiretrovirals such as nelfinavir (Viracept) and ritonavir (Norvir) that require food for absorption.
- Food insecurity ↑ increases the risk of obesity.
- Patients may appear well nourished when actually experiencing many nutrient deficiencies → higher nutrition risk.
- Difficult to differentiate from protein-energy malnutrition; key difference between lipoatrophy and PEM is the preservation of lean body mass in lipodystrophy.
To accurately assess nutritional needs, including estimated energy and protein needs, the following should be examined because they influence a patient’s nutritional needs, as well as his or her ability to eat and digest foods and to absorb nutrients from food:

- Viral load
- Stage of the disease
- Appetite
- Active infections
- Cancer
- Cancer therapy
- Drug use
- Health of the GI tract
- Metabolic rate
- Fever

During advanced stage disease several conditions may increase nutritional requirements & decrease nutritional intake.
Weight & Energy Intakes

- Weight loss & wasting → ass. with morbidity & mortality
- Anorexia caused by incr IL1&6 & tumor necrosis factor α = major cause of weight loss.
- Opportunistic infections (esp. oral & GI), tumors & other manifestations of advanced disease (fatigue, dyspnea, fever) – further causes of severe weight loss
- After initiation of ART - adverse effects of certain drugs (e.g. nausea and vomiting)
- Energy needs ↑ 10% from the time of infection & by 20% to 30% during chronic illnesses or opportunistic infections.
- Pts on ART – more gradual weight loss
- Caloric needs are higher in HIV-positive patients due to the disease itself, complications from the disease and the use of ART
Other conditions further contribute to the malnutrition of individuals with advanced HIV disease:

- Infection by intestinal parasites and *Mycobacterium*,
- decreased small bowel transit time,
- decreased carbohydrate absorption,
- bowel wall edema due to serum hypoalbuminemia,
- and abnormally high fecal fat excretion can lead to severe malabsorption.
- Abnormal nutrient utilization and metabolism,
- Hormonal abnormalities,
- Loss of gut-associated lymphoid tissue during the initial phase of HIV infection can cause lasting impairment in the integrity of the gastrointestinal epithelial mucosal barrier and may predispose toward bacterial translocation across the gut wall
- Psychosocial stress
WEIGHT LOSS PREDICTS DEATH

• Low weight reflects advancing disease
• Weight loss often indicates opportunistic infections or progressive disease
• Weight loss should be a warning to the doctor/nurse to initiate investigations and treatment
Nutritional Requirements

- As viral load increases - E requirements increase
  - Initial increase: 10% - Advanced stage disease: 20-30%

Protein Requirements:
- Recommended daily protein intake is 1.5 grams per kilogram (g/kg) of usual or ideal body weight.
- Advanced stage disease, protein intake of 2.0 g/kg may be beneficial.
- More research required.
- Consider renal disease.
HIVAN: apply usual CKD guidelines
- restrict proteins if not on dialysis.
- Late manifestation of HIV disease
- limited research
Nutritional Counseling and Intervention

Evidenced-based nutrition practice guidelines for HIV/AIDS:

- **Goal of nutrition intervention:**
  - is to delay HIV disease progression through prevention and treatment of malnutrition;
  - to provide education on food and water safety;
  - to decrease the impact of comorbidities associated with HIV.

**Early stages:**

Healthy weight, metabolic abnormalities, lipodystrophy, wasting (often masked by altered fat distribution)

**Indications for nutritional counselling or EN in HIV?**

- Nutritional therapy is indicated when significant weight loss (>5% in 3 months) or a significant loss of BCM (>5% in 3 months) has occurred.
- In addition, nutritional therapy should be considered when the BMI is <18.5kg/m² (C).
- NB: don’t focus on weight only.
Nutritional Counseling for Patients with Advanced HIV Disease

- Anorexia
- Weakness / fatigue
- Oral thrush
- Dysphagia
- Xerostomia
- Taste changes
- diarrhoea & malabsorption
- Fever
- Anaemia

Nutritional counseling
Pharmacotherapy
Oral Supplementation
Enteral Nutrition / PEG
TPN
Nutritional Counselling

- Anorexia
- Weakness / fatigue
- Oral thrush
- Dysphagia
- Taste changes
- Diarrhoea & malabsorption
- Fever
- Anaemia

Eat soft mashed foods, such as boiled carrot, scrambled eggs, mashed potatoes, bananas, soups, porridge.

- If available, use a spoon or cup to eat small amounts of foods.
- Eat cold or room temperature foods.
- Drink plenty of fluids.
- Avoid spicy, salty, or sticky food, vinegar; these may irritate mouth sores.
- Avoid sugary foods; these cause yeast to grow.
- Avoid strong citrus fruits and juices which may irritate mouth sores.
- Avoid alcohol.

**NB** – timely assessment by speech therapist - alter food consistency, e.g. avoid thin liquid & coarse foods if malnutrition/ reduced intake: supplementation & fortification - use flavor enhancers (e.g., salt, spices, herbs, lemon).

Chew food well and move around mouth to stimulate receptors.

Drink lots of fluids to avoid dehydration (e.g., soups, diluted fruit juices, boiled water, herbal teas). • Drink juices such as passion fruit; avoid strong citrus (e.g., orange, lemon) because it may irritate the stomach. • Consume foods rich in soluble fiber to help to retain fluids (e.g., millet, banana, peas, lentils). • Eat starchy foods such as rice, maize, sorghum, bread, potato, cassava and blended foods like corn-soy blend (CSB). • For protein, eat eggs, meat, chicken or fish. • Boil or steam foods. • Consume fermented foods like porridges and yogurt. • Eat small amounts of food frequently and continue to eat following illness to recuperate from weight and nutrient loss. • Eat soft fruits and vegetables like bananas, squash, banana matoke, mashed sweet potato, mashed carrots.

Drinks to avoid/reduce intake:
- Some dairy products such as milk if lactose intolerant.
- Caffeine (e.g., coffee, teas) and alcohol.
- Fatty foods including fried foods and extra oil, lard or butter.
- Gas-forming food such as cabbage, onions, and carbonated soft drinks (e.g., sodas).

Eat more iron- and folic acid-rich foods such as animal products (e.g., eggs, fish, meat, liver), green leafy vegetables (e.g., collard greens, spinach), legumes (e.g., beans, lentils, groundnuts), and fortified cereals. • Consume vitamin C-rich foods (e.g., citrus fruits, green leafy vegetables) at meal times to improve iron absorption. • Do not drink tea, coffee, milk and cocoa at meal times; these inhibit iron absorption. • Take iron folate supplements as recommended by a health worker.
Nutritional counseling

- **Nutrition counseling alone OR nutrition counseling with ONS**
  - equally efficient in the beginning of nutritional support &/ OR for preserving nutritional status
  - if no qualified nutritional counseling available - ONS may be indicated in addition to normal food but this should be limited in time

Oral Supplementation

- Advanced disease: supplementation & counseling more effective than supplementation alone.
- Supplementation with a whole protein formulae - more effective in malnourished, symptomatic HIV-infected patients than normal food alone.
- Immune modulated formulas - no evidence that they are superior to standard formulars.
- Oral supplementation effective in increasing total E intake for 2-6 weeks, thereafter increases are minimal.
- **Nutritional support in patients with dysphagia or if ONS are not effective:**
  - If normal food intake and optimal use of ONS cannot achieve sufficient energy supply, TF is indicated
  - Comparison of actual oral intake with estimated needs
  - TF - weight gain, but mostly fat mass. - Nutritional support without physical activity is unlikely to restore muscle mass.

- **Is EN indicated in patients with diarrhoea and/or malabsorption?**
  - Diarrhoea does not prevent a positive effect of ONS or TF on nutritional status.
  - EN has a positive impact on stool frequency and consistency
  - PN – higher E intake and more weight gain, but mostly fat mass.
  - EN – better quality of life and greater physical activity
- no advantage for any specific formula has been shown.
- Standard formulae should be used.
- For patients with diarrhea and severe undernutrition, MCT containing formulae are advantageous

Specific complications of Enteral feeding in HIV positive patients:

- Local infections, with or without limited peritonitis, have been observed in HIV patients with PEG feeding more often than in other populations
- ANtibiotic prophylaxis
**Testosterone:**
- HIV positive patients with testosterone deficiency should receive testosterone substitution to restore muscle mass.
- Testosterone - consider in patients with HIV wasting syndrome to reverse muscle loss → concern about the adverse metabolic effects of long-term testosterone administration and long-term follow-up for these patients is needed.

**Human Growth Hormone & Steroids**
- rhGH and anabolic steroids may increase fat free mass and muscle mass
- Moderate gain in body weight and fat free mass can be achieved by recombinant human growth hormone (rhGH) at high cost.
- Anabolic steroid oxymetholone (100mg/day) resulted in an increase in body weight, muscle mass, and functional parameters, but the effect was limited by a significant dose-dependent liver toxicity in ~30% of the patients & higher risk of metabolic abnormalities.
Pharmacotherapy

- Appetite may be increased by treatment with high doses of megestrol acetate and this is associated with weight gain, but mostly increase in fat mass.
- Cannabinoids may improve perceived appetite, but do not impact weight to the same extent that medication does.
- The use of these drugs is limited by high cost and adverse reactions.
Food Safety & Hygiene

- Food and water safety education is NB during any stage of HIV infection.

- PLWHAs are more vulnerable to infection because their immune systems have already been weakened.

- Properly handling food and water is especially important to avoid infections caused by bacteria and viruses in contaminated food and water.
Nutrition and HIV/AIDS Nutritional Guidelines for HIV-infected Adults and Children in Southern Africa: Meeting the Needs

- Weight loss predicts death.10
- Energy and nutrient needs are increased in the HIV-infected.11
- Adequate food – and not just vitamins and so-called immune boosters – constitutes an appropriate supplement for those in need.12
- Nutritional security: Food alone is not enough. Children and adults who are malnourished, whether they are infected, exposed or affected, need comprehensive medical and nutritional care and social support.13
Early Nutrition intervention is key! Early education is just as important!
PLWHA have increased nutrient requirements and often reduced or altered intakes.
Micronutrient, protein and energy needs are elevated.
Assess and evaluate for masked malnutrition (esp in overweight patients or pts with Lipodystrophy & food insecurity.
If funds are available, check individual nutrient levels.
Education:
- Dyslipidaemia, insulin resistance etc. – complications later
- Proteins, including affordable protein sources (legumes, seeds, peanut butter)
- Balanced diets & good micronutrient and fibre intakes
- Possible intolerances as disease advances
Refer for exercise.
Don’t wait too long before initiating EN.