Nutrition and the ailing immune system: a challenge in the new millennium

P.L.P. Disele, S. Peters, T. Masoloko, & A. Shumba
University of Botswana, Home Economics & Educational Foundations

Introduction

The new millennium has come but we are not healthy: the Human Immuno-deficiency Virus (HIV) is taking its toll. It is critical for everyone to find ways of coping with this problem, along side campaigns to eradicate the virus. There is need to explore the power of nutrition in boosting the immune system.

Research indicates that food and nutrition can quell symptoms, counter drug side effects, delay the onset of Acquired Immuno-Deficiency Syndrome (AIDS) related conditions and subsequently prolong life. While waiting for HIV/AIDS drug to be discovered, it is necessary to sensitise the community about the importance of good nutrition to the immune system. This is particularly so because nowadays home based care is advocated.

Botswana, together with the rest of the world are advocating for people to be cared for at 'home' for many reasons. Some of these are: hospitals are overloaded, insufficient trained personnel, people often feel better when they are cared by those who are close to them. Presently, the invariable outcome of AIDS is death, because there is no cure and no vaccine to prevent the virus. In view of this, it is imperative to address some critical issues relating to food and nutrition and inculcate healthy eating habits among people, whether they are infected or not. It is important therefore, that all people in this country be sensitised about the value of nutrition in the sustenance of life and the impact of different methods of food preparation to the quality of food.

There are a number of factors that may affect nutrient accessibility to individuals. Some of these factors are: eating a variety of foods which contain necessary nutrients, using food processing and preparation methods that are preservative to nutrients, avoiding the use of additives that may destroy nutrients or/and may be a health hazard to people, the economic status of the people and the availability of the food. Lastly, knowledge and understanding about the relationship between diet and health also has a bearing on what people choose to eat.

HIV/AIDS and the immune system.

A lot has been said about the causes, prevention and the impact of HIV/AIDS on individuals' health, and the society; with little emphasis on the role of good nutrition on the immune system. Studies have shown that a deficiency of almost any nutrient affects a cell's ability to fight infection and handle foreign invaders (Lutz and Przytulski 1997).

As we may already know, HIV tends to collapse the body's natural immunity against diseases. The virus enters the white blood cell, attaches itself to the surface of a special cell known as T-cell, which is responsible for fighting infection. A person infected with the virus therefore, has no protective defence against infection and will eventually develop AIDS. When this happens, the individual is attacked by opportunistic infections.

According to Lutz and Przytulski 1997 AIDS is characterised by, among other things, weakness, anorexia (weight loss), diarrhoea, fever and decreased white blood cell count. Weight loss may result mainly from malabsorption of nutrients, elevated metabolism, increased gastrointestinal losses from diarrhoea and reduced or loss of appetite. Experts believe that malnutrition aggravates AIDS and may suppress any residual immune function;

as a malnourished person with AIDS has minimal internal resources to fight opportunistic infections. It is further asserted that good nutritional status influences an individual's response to medication by reducing the incidence of adverse drug reactions and provid8ing available raw materials for reactions evoked by medication as well as giving support to the body organ functions. Good nutrition and weight maintenance are vital in delaying the onset of AIDS by helping to preserve the immune function. It is proper to say that adequate diet is a pre-requisite to a healthy immune system.

The relationship between food, nutrition and health.

Nutrition concerns the food people eat and how their bodies use it for various purposes. Food is one of the prime necessities of human life that supplies the body with all the necessary nutrients in order to maintain health. It is important to supply the body with a variety of nutrients because they perform different functions in the body.

Functions of nutrients. The nutrients that are found in food are: carbohydrates, proteins, vitamins, minerals, facts and oils. Nutrients are essential for providing the body with energy, building and repairing tissues, protecting the body against infections and regulating body metabolic processes.

Carbohydrates, fats and oils are needed to supply the body with energy and excess is stored as body fat. These nutrients are therefore necessary in weight maintenance. Individuals with HIV/AIDS should have a diet that is rich in carbohydrates, because these people are susceptible to weight loss resulting from high metabolic rate; lack of desire for food and other AIDS related conditions such as diarrhoea and vomiting. However, fatty foods should be avoided since they are difficult to digest and may lead to nausea.

Sources of carbohydrates include foods such as sorghum, mealie-meal, bread, rice, potatoes, and watermelon, jam. Fatty food include pastries, pies, fat meat, fried foods, etc.

Protein is responsible for building and repairing warn out tissues as well as for supplying the body with energy in times of need. All the body cells, including those in the blood, are made up of protein and therefore a lack of protein in the diet will contribute to depletion in the body cells. The fact that proteins build and repair tissues is a clear indication of their role in the production of antibodies, which fight against infection. The most obvious sign of protein wasting in HIV/AIDS patients is the loss of skeletal muscles. However, research shows that in AIDS patients, the muscle protein wastage appears whether or not the patient takes adequate protein. Inadequate carbohydrate in the body will make the body use up the protein for energy and thereby making it unavailable to perform its vital functions.

Protein functions include:

- Growth and maintenance of tissues: increases in muscle mass, growth and maintenance of hair, skin and matrix or framework for bones and teeth, give strength and rigidity to body tissues)
- Formation of essential body compounds: supplies certain essential substances for the construction and proper functioning of important body compounds such 'antibodies', haemoglobin and enzymes.
- Regulation of water balance
- Maintenance of body neutrality
- Sources of protein: animal product, dairy products, plant products such as pulses.

Vitamins and minerals are necessary for protection of the body against disease and for regulating body processes. Deficiencies of iron, zinc, folic acid, vitamin B-group, C, and A are associated with immunological changes.

- Vitamin A is necessary for adequate immune response. Deficiency in vitamin A is known to increase the risk of infection (Peckenpuagh and Poleman, 1995). *Sources*: pumpkin, carrots melon, dark green leafy vegetables such as Thepe, spinach.
- Vitamin B-group helps the body use protein properly required for metabolic processes, promotes good appetite and good functioning of the digestive tract, important in energy metabolism, especially folic acid, promotes good physical and mental health. *Sources*: food of animal origin, fish, cereals, beans, peanuts, peas and small amounts in vegetables.
- Folic Acid is essential for formation of red blood cells and aids in metabolism of protein and DNA (deoxyribonucleic acid, a basic structure of genes and thereby found in all cells). *Sources*: legumes, whole cereals, dark green leafy vegetables.
- Vitamin C helps the body against infections, wound healing and play an important part in the absorption of Iron, involved in changing foliate to folic acid. Higher levels are necessary during conditions of stress, maintain mental health and with certain medications (Peckenpuagh and Poleman, 1995). Its presence is necessary to build collagen, the 'cement' that holds together the tissues throughout the body. It combats toxic substances in food and water. Deficiency will result in bleeding gums, tendency to bruise, shortness of breath, impaired digestion, swollen and painful joints, lowered resistance to infection, and slow healing of fractures and wounds; condition not need for people living wit HIV/AIDS. *Sources*: citrus fruits watermelon, green leafy vegetables, peas, lentils, sweet paper and potatoes.
- Zinc is responsible for synthesis of protein, promotes wound healing, it is involved in immunity and can reduce the risk of retinal degeneration of the eye among older adults. Although zinc is primarily stored in bone, it is poorly mobilised, and therefore regular dietary intake is crucial. Research shows that, individuals with malabsorption such as those with chronic diarrhoea, short bowl syndrome, are at risk for zinc deficiency. *Sources*: high-protein foods, especially liver, legumes, leafy vegetables, and whole grains.

There is a considerable interdependence of nutrients, and therefore, insufficient intake of some will interfere with the absorption of others. For example, lack of vitamin C will hinder the absorption of iron, while excess intake of iron, folic acid will prevent the absorption of zinc.

Availability of nutrients to the body

Accessibility of nutrients to the body is governed by different factors.

Eating a variety of foods. Provision of variety might prove difficult for most households because of scarcity of food, and may be worsened by the depletion of family resources, which may be over stretched by taking care of the sick. Under these circumstances, people need to find a cost-effective way of ensuring and maintaining a good diet. It would therefore seem imperative to make use of locally available foods.

It is acknowledged that indigenous food might be difficult to find in some localities due to environmental degradation, for example food such as *morama*, which are rich in protein, wild vegetables and fruits and that fact that they are seasonal. It is for this reason that the Ministry of Agriculture is to encourage people to take rigorous steps in influencing people to produce a wide range of food including indigenous food.

Food processing. Methods of food processing, preparation and storage have impact on nutrient. Just because food has a nutrient does not necessarily guarantee that the body will have access to the nutrients as this depends on how it is handled and processed from the garden, in the pot, and in the body. Food loses some nutrient content during storage, preparation, preservation and cooking.

Although some food processing methods destroy nutrients; there are some, which enhance the nutritive value of food. *AIDS Action* published by AHRTAG–Southern Edition, (Issue 30 January-March 1996) states that fermented and malted food help in boosting the immune system, as well as increasing concentration and absorption of some nutrients such as zinc and iron. This implies that, when dealing with HIV/AIDS patients, good cultural practices pertaining to food should not be ignored. Having said this, it should however, be noted that excessive consumption of alcoholic beverages even though they are malted products, contributes to malabsorption of nutrients. Hence alcohol should be avoided by all particularly by people with HIV/AIDS, if they are to stay healthy.

There is some vitamin loss in all methods of processing due vitamin instability. Losses are caused by enzyme activity in food, oxidation, heat, light, alkalinity and solubility in water and fat.

Freshness and storage of food. Some nutrient are lost by enzyme activity and oxidation as food become stale, for example it is known that 30 percent of vitamin C in cabbage is lost after storage for one day; enzymes are destroyed above 85 degree C. All food should therefore be used as fresh as possible. Food should be stored in a cool place and freeze those that need freezing.

Preservation of food. The water-soluble vitamins, B-group and vitamin C, are the most susceptible. During drying, there is a great loss of vitamins, for example approximately 50 percent loss of vitamin in fruit and vegetables; 65 percent loss of thiamine (vitamin B1) in dried meats. There is considerable loss of vitamins in canning and vacuum-packing, especially in the canning process. However chemicals are sometime added to preserve vitamin content, for example sulphates preserve vitamin C.

Cooking conditions. Water-soluble vitamins are readily destroyed by certain cooking techniques. The vitamin content of the cooked food is dependent on:

Nutrient content of food used: There is a greater concentration of vitamins in outer leaves and skin of fruit and vegetables. It is therefore important not to discard these leave or skins, but to cook and eat them. The examples of which are cabbage leaves, potato skin, and variety of fruits such as mango and motlhatwsa.

Effect of oxidation: Some of vitamin B-group and C are destroyed by oxidation or by action of enzyme oxidase, which is released from plant tissue. The greater the exposure to the air, the greater the nutrient loss. For example chopping vegetables and fruit with a blunt knife exposes the cell more to air and oxidation. This does not only expose the cell to air but also make the food to brown rendering it unattractive; yet food should look attractive in order to induce appetite.

Effects of heat. Vitamin B-group and C are very sensitive to heat. Prolonged method of cooking such as stewing lead to losses in vitamin C and some of the B-group. Note the impact of these vitamins in the immune system. Furthermore, certain methods of cooking affect digestibility of food. For example, frying food in oil coagulates the protein and renders it difficult to digest.

Cooking meat for too long renders it indigestible due to protein coagulation by heat. All these may hinder availability to nutrients to the body.

Food additives. Food additives play an important role in modern food supply. They contribute to the variety, convenience, safety and taste of food, and also ensure availability all year round. While this is so, it has been found that some additives such as sodium bicarbonate (an alkaline solution) used in cooking of *delele* and washing vegetables with it increases the rate of destruction of vitamin C. Thiamine is also destroyed in alkaline conditions.

Solubility in water. Vitamin B-group and C dissolve in water, for example when cooking green vegetables in water there is a loss of about 40 percent of B-group vitamins and 70%

loss of vitamin C. This suggests that foods containing these vitamins should not be kept in water for long periods. They should be washed quickly and cooked with very little water, or steamed.

Hygiene is essential in food handling and food preparation. The preparation, storage, cooking environment and utensils must be kept clean all the time. Personal hygiene must be maintained. Avoid contamination of food, by keeping food separate from inedible substances. Also avoid refreezing thawed foods, as refreezing will increase multiplication of microbes/bacteria. Leftover food should be avoided as much as possible. Avoid storing cooked food for 24 hours. Thoroughly reheat food that has been kept more than two hours after being cooked. This will reduce the risks of microorganisms. These will prevent diarrhoea.

Diet considerations for people living with HIV/AIDS

In the preceding discussions, it is clear that people living with HIV/AIDS need adequate supply of protein for muscle building and body tissue maintenance; carbohydrates for energy and to prevent loss of weight and anorexia nervosa; vitamins for body process regulation and boosting of the immune system in particular vitamin C, A, the B-group, folic acid and minerals such as iron and zinc; for prolonging life. Many other nutrients help maintain health and thereby reduce the stress on the immune system. Generally, a person with HIV will not have additional requirements beyond the requirements for healthy persons until the onset of AIDS Because of their condition, they must be extra careful and selective of the food they eat.

A knowledge about nutritive value of different foods should be accompanied by sensitivity towards food handling, processing, preserving, preparation, and storage practices that are will conserve the nutrients.

A pertinent issue is the availability, accessibility and affordability of food to people.

Nutrition related to complications. Studies by Peckenrpuagh and Poleman offer the following dietary recommendations when caring for a patient with AIDS related conditions.

- *Diarrhoea*: Follow a low-fat diet, for example, no fried foods or fat rich foods such as pastries, pies, fried chips, and fried meats. Avoid gas-forming foods such as Legumes; hot spices should not be used. Follow a low-lactose diet. Offer clear liquids with dilute juice. Serve food warm, and small frequent meals. Also avoid caffeine-containing beverages such as tea. Avoid *serobe* (tripe).
- *Nausea and vomiting*: Emphasis low fat foods such as steamed foods. Food should be offered when nausea is absent, because the smell and sight of food may trigger vomiting. Avoid gas forming and spicy foods. High concentration of very sweet foods should be discouraged. Offer kilocalorie liquids between meals and allow to sip slowly. Encourage rest after meals.
- *Anorexia (weight loss)*: Encourage frequent meals, offer high-calorie and high protein foods. Provide pleasant, relaxing atmosphere fro meals and make food attractive and appetising to stimulate appetite. Offer drinks between meals and snacks rather that with meals because they may hinder intake of adequate food. Arrange meals with friends and family members as eating alone may be depressing and may suppress appetite.
- *Thrush in the mouth, and dry mouth*: Offer semi-solid foods or pureed food. Avoid academic and spicy food. Acidic foods are sour in taste such as sour milk, sour porridge, vinegar dressed food such as salads and potato chips. Increased kilocalories.
- *Swallowing difficulties*: Offer soft or semi-solid foods or pureed food, adequate fluids, allow the person to swallow slowly.
- *Fever:* Offer high-calorie, high protein diet, and increase fluids.

Conclusion

Everyone in society should be empowered with the vital knowledge of how best to protect their immune system. The interventions should include:

- Provide information/ education on the importance of good nutrition to the immune system.

Implementation: information would be collected through research and by publishing pamphlets, as well as involving professionals with nutrition knowledge to educate people on nutritional issues. This information would be passed on to people through Kgotla meetings, radio media, nutrition, and pamphlets.

- Provide training programmes/ educational materials to children, women and men, food institutions, schools, on better methods for preparing food to conserve nutrients required for boosting the immune system, building of body muscles, and for repairing of body tissues.

Implementation: provision of training programmes/ educational materials through the use of video shows, demonstration workshop and seminars.

- Provide nutrition counselling to individuals, families, and groups in the community.

Implementation: individual, family and group counselling sessions to re-assure people and emphasise the need for good nutrition and precautions to be taken when caring for people living with HIV/AIDS.

- Encourage growing of backyard gardens and usage of Wild Fruits especially in areas where shelf fruits are not accessible. Home gardening will provide a low-cost, sustainable strategy for increasing household food security.

Implementation: Better methods of preservation of locally available foods should be introduced, and people be encouraged to utilise local/ traditional foods and not only to rely on shelf food. It is noted with regret that the use of indigenous foods is not popular in most households, and if ever found there is little variety in methods of preparation. This also calls for the need to revitalise Setswana cultural practices pertaining to foods, including the development of recipes that take cognisance of health.

- Collect and disseminate information on food availability and develop recipes. Information should be collected and disseminated through research, publishing and launching of recipe-books. Production of indigenous vegetables and other foods should be maximised in order to cater for even those in the remotest areas.

Implementation: concerted effort of all stakeholders is needed. The Ministry of Agriculture should take the lead through its different units. The Ministries of Local Government and of Health should deploy extension staff encouraging backyard gardens. There is enormous scope for the involvement of the Private Sector, NGO's, other ministries, and all individuals who are interested parties.

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