

Potential Effectiveness of Applying Soluble Fiber Supplementation with Medical Nutrition Therapy Intervention for People Living with Chronic HIV with Dyslipidemia: A Systematic Review

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ABSTRACT

The side effects of antiretroviral drug therapy have been linked to an increase in the prevalence of dyslipidemia among people living with HIV (PLHIV) (ART). Abnormal blood lipid profiles are well known for causing complications such as stroke and ischemic heart failure, which can increase mortality. Soluble fiber has been shown to reduce blood cholesterol and low-density lipoprotein (LDL) cholesterol. Furthermore, medical nutrition therapy (MNT) based on the therapeutic lifestyle change diet (TLC diet) effectively improves blood lipid profiles in PLHIV with dyslipidemia. The data could be used to notify dietetics and other healthcare professionals to provide health support for PLHIV with dyslipidemia and to generate future studies using soluble fiber supplementation in MNT based on TLC diet intervention.

Keywords: HIV, Dyslipidemia; Soluble fiber; Medical nutrition therapy; Therapeutic lifestyle change diet

Introduction

Human immunodeficiency virus (HIV) is an infectious illness that primarily affects immune system function. According to a recent research, 38 million individuals worldwide are living with HIV (PLHIV) [1]. PLHIV must undergo antiretroviral treatment (ART) medications to decrease viral load and maintain appropriate CD4 levels, as well as to avoid the possibility of Acquired Immune Deficiency Syndrome (AIDS), which can lead to opportunistic infections and a higher risk of death [2]. However, throughout the last two decades, adverse reactions to ART medications have significantly impacted PLHIV, resulting in a deterioration in their quality of life [3, 4]. The most prevalent adverse effects of PLHIV on long-term ART medication therapy are dyslipidemia and an altered blood lipid profile [5]. Prior research has discovered that PLHIV who got ART are at risk for raised total or low-density lipoprotein (LDL) cholesterol levels or low levels of high-density lipoprotein (HDL) cholesterol [6-8]. Because of this, people living with HIV who have dyslipidemia are more likely to acquire a variety of non-communicable diseases, such as cardiovascular diseases

and ischemic heart failure, which could lower their quality of life and raise their death rate [9].

The goal of medical nutrition therapy (MNT), a dietary intervention therapy for patients with various health and/or medical conditions, is to improve nutritional status, prevent malnutrition, and promote rehabilitation through nutritional assessment, examination, action, evaluation, and tracking. It is based on evidence and guidelines. Dietitians or nutritionists with communications abilities lead these sessions, teaching patients about daily physical activity and meal planning. Prior research has demonstrated the efficacy of MNT in enhancing patients' health status when administered in conjunction with routine medical therapy by healthcare providers. According to a study, MNT intervention can enhance patients' quality of life and effectively control type 1 and type 2 diabetes [10]. Furthermore, MNT treatment has been shown to be beneficial in raising patients' blood glucose levels and general health. Previous research has shown that MNT intervention, which encourages the consumption of low-fat foods, moderation in alcohol consumption, and increased activity, is an effective way to lower the risk

of complications and mortality among patients with coronary heart disease [11]. Research on PLHIV showed that MNT was useful in lowering blood lipid profiles through better dietary practices [12]. The therapeutic lifestyle change (TLC) diet is a nutritional recommendation for lipid disorders patients that successfully lowers blood lipid profiles. It does this by emphasizing changing eating habits, such as increasing the amount of unrefined grains consumed, getting enough fruits and vegetables, consuming moderate amounts of alcohol, and increasing daily exercise [13, 14]. Additionally, research has demonstrated that dietary supplements can be used as a nutritional intervention to improve nutritional status and avoid vitamin deficiencies, which lowers the death rate among PLHIV [15]. Studies have demonstrated the efficacy of soluble fiber supplements in lowering blood lipid profiles, specifically TG and LDL cholesterol, and in raising HDL cholesterol in individuals with dyslipidemia [16]. In addition, soluble fiber supplements help PLHIV patients reduce their fat accumulation [17]. This review article aimed to present the evidence based on the benefits of soluble fiber supplements and MNT intervention based on the TLC diet to point out the potential integration of this knowledge for future studies.

Methods

Searching methodology

To find out the confidential information and literature presented in this article, the research articles indexed in acceptable databases such as SCOPUS, PubMed, and Elsevier have been searched. The exclusion criteria were that the article that was published in the journal was outside of these databases or predator journals.

Dyslipidemia among PLHIV who are on ART

Abnormal blood lipid level is one of the most common problems found among PLHIV who received ART, especially highly active antiretroviral therapy (HAART). Previous studies revealed an increased prevalence of PLHIV with dyslipidemia caused by ART regimes. According to earlier research, 63.1% of PLHIV who received ART also had dyslipidemia, and 39.2% and 11.2%, respectively, had high total cholesterol (TC) and low-density lipoprotein (LDL) cholesterol. Low levels of HDL cholesterol were present in 14.6% of subjects [18]. According to a study conducted in Ethiopia, 82.0% of PLHIV on ART had dyslipidemia as their diagnosis and at least a single laboratory abnormality [19].

In Ethiopia, a high prevalence of dyslipidemia among PLHIV has been reported [20]. In accordance with reports, the frequency of PLHIV with dyslipidemia has increased in Thailand, where 53.0% of adult PLHIV on ART also had this disease [21]. In a study conducted in Cameroon, 51.0% of PLHIV who received ART had cholesterol above the optimal level, whereas LDL-

cholesterol above the optimal level occurred in 36.9% [22]. A study in China revealed that PLHIV had a significantly higher risk of developing hypercholesterolemia compared to HIV-negative people. Increased prevalence of LDL-cholesterol above optimal level and low levels of HDL-cholesterol were reported among PLHIV in China. In addition, the study revealed that a low level of CD4 was related to an increase in TC, which can lead to opportunistic infection risk and mortality [23].

Dyslipidemia in PLHIV was not a health problem in adults, as a previous study revealed that 33.0% of HIV-infected children who were on ART had dyslipidemia and 80.0% had lipodystrophy [24]. Therefore, blood lipid profiles should be monitored among PLHIV who were on ART. At present, drug therapy is the most commonly used form of treatment in dyslipidemic patients. The management of dyslipidemia and the risks associated with HIV-related cardiovascular disease is complicated, which makes it difficult for health and medical professionals to determine the best course of action for managing hyperlipidemia in patients with HIV infection. However, prior research has shown that all statin drug groups can be used safely and effectively in treating HIV-related dyslipidemia [25]. Furthermore, research has shown that nutritional support is one of the major elements that can help reduce the risk of dyslipidemia by focusing on food consumption, such as encouraging moderate quantities of alcohol, low saturated fat intake, and improving dietary fiber intake [26].

Nowadays, no specific blood lipid criteria for PLHIV are used in screening abnormalities of lipid levels in the blood. Therefore, many studies used blood lipid panels as the same criteria for blood lipid screening in healthy people [27, 28]. Fasting lipoprotein level criteria used for screening are as follows [29]:

Table 1 Blood lipid profile criteria

Lipid	Optimal	Borderline	High risk
TC, mg/dL	<200	200-239	≥240
HDL, mg/dL	≥60	40-59 (men) 50-50 (women)	<40 (men) <50 (women)
LDL, mg/dL	<100	130-159	160-189 high ≥190 very high
TG, mg/dL	<150	150-199	200-499 high ≥500 very high

Benefits of soluble dietary fiber supplementation

The dietary supplement is well known as a good strategy to prevent nutritional deficiency and support nutritional status. Soluble dietary fiber, commonly found as non-fermentable fibers (e.g., raw guar gum, β -glucan), is a fiber that can solubilize in

water and is usually found in different vegetables and fruits and is beneficial to cholesterol lowering, improving glycemic control, and enhancing laxative effect [30]. Also, soluble dietary fiber is used as a dietary supplement to improve health status and prevent many chronic disease developments.

A previous study revealed the effectiveness of using soluble dietary fiber supplementation in patients with type 2 diabetes (DM) and found that participants in the supplement group significantly improved their insulin-resistant index and blood lipid profiles [31]. In addition, a previous study pointed out that soluble dietary fiber effectively lowered the risk of cardiovascular development among patients with type 2 DM by lowering TG, LDL-cholesterol, TC, and blood pressure [32]. Other studies in 2010 revealed the benefits of soluble dietary fiber in obesity and metabolic syndrome management by improving satiety and gastrointestinal functions [33].

Also, adequate soluble dietary intake effectively lowered the risk of diverticular disease development [34]. For dyslipidemia numerous reports found the effectiveness of using soluble dietary fiber to improve blood lipid profiles among patients with dyslipidemia. Studies found that increasing food sources of soluble dietary fiber, such as whole grains, legumes, and fiber-enriched food, benefited digestive health and assisted in weight management, cardiovascular health, and general wellness [35]. It is suggested that supplement soluble fiber, each 5g/d, effectively lowers blood cholesterol [36].

A randomized clinical trial reported the effectiveness of using soluble dietary supplements in healthy participants and found that there were significantly lower LDL-cholesterol levels and glucose levels among intervention groups compared with the control group [37]. In addition, the study revealed that soluble dietary fiber supplements in patients with dyslipidemia treated with highly effective lipid-lowering therapy had favorable effects [38]. The Institute of Medicine's Adequate Intake Guideline suggests 14 g of dietary fiber per 1,000 kcal consumed, which is approximately 25 g/day for women and 38 g/day for men [39].

Unfortunately, previous studies found that many countries' populations did not meet the suggested amount. For example, the average American dietary fiber consumption was only 15 g per day [40]. In Thailand, low amounts of fruit and vegetable consumption were reported among younger Thais, possibly influenced by their socio-economic status and their parents' role [41].

Effectiveness of MNT for people with dyslipidemia

Patients with various conditions have distinct requirements for MNT, a nutritional treatment shown to improve patients' health and quality of life. Many

researchers have reported on using MNT to enhance nutritional status and dietary requirements, such as for patients with eating disorders who must maintain their body weights by enhancing oral meal intake [42]. Studies on HIV have shown that MNT intervention can enhance PLHIV's nutritional health by providing knowledge about food intake and inspiring people to modify their dietary behavior. MNT for PLHIV focuses on maintaining muscle mass and body weight, minimizing fat deposition, and avoiding raw food, which must not contradict the patient's beliefs and culture [43]. Nutritional guidelines for PLHIV to maintain and optimize nutritional status are as follows:

Energy

For asymptomatic PLHIV, a 10.0% increase in total calorie intake is recommended to maintain body weight and prevent weight loss due to increased resting energy expenditure (REE). The prescription for symptomatic PLHIV is to increase total energy intake by 20.0-30.0% to prevent weight loss, maintain body weight, and defend against symptoms.

Protein

A sufficient intake of protein is strongly recommended to support the immune system in fighting against infection. However, no database is available that suggests the amount of protein intake per body weight for PLHIV.

Fat

At present, suggestions on fat intake among PLHIV have not yet been established. However, fat consumption is recommended and should be individually considered case by case.

Vitamins and minerals

According to the Recommended Dietary Allowances (RDA), PLHIV should be advised to take vitamins and minerals, especially calcium, vitamin D, Mg, and P, to prevent bone loss and support immune function. The recommended daily intake of calcium should be around 1,000 mg, phosphorus 700 mg, magnesium 400 mg, and vitamin D 600 IU [44]. In addition, intake of vitamins and essential elements (vitamin A, Zinc, Vitamin C, iron, etc.) above the RDA recommended levels may be suggested among PLHIV to promote immune function [45].

For patients with dyslipidemia, the TLC diet is most accepted for its effectiveness in promoting blood lipid profiles among patients with dyslipidemia. Previous studies revealed that the MNT intervention based on the TLC diet guideline can lower triglyceride (TG), LDL-cholesterol, and TC, as well as its effectiveness in increasing HDL-cholesterol by encouraging patients to change their dietary habits and increasing their physical activity [46]. Another study using the TLC diet intervention with dietary fish intake

among participants in middle-aged and elderly with dyslipidemia found significantly lower blood lipid profiles (TG, TC, and LDL-cholesterol) after intervention compared with before intervention [47]. A study reported that TLC diet intervention benefits in lowering the inflammatory cytokines, IL-6, and TNF-

alpha in obese participants, the group of people at high risk of hyperlipidemia [48]. In addition, previous studies revealed that the TLC diet also effectively promoted the immune system among hypercholesterolemia patients [49]. Eating patterns and physical activity modification according to the TLC diet guidelines are as follows [50]:

Table 2 Nutrients and suggestions of the TLC diet

Nutrient and suggestion	Recommended
Saturated fatty acids (SFA)	< 7% of total daily calories
Cholesterol	<200 mg/d
Monounsaturated fatty acids (MUFA)	10%-20% of total calories
Polyunsaturated fatty acids (PUFA)	Up to 10% of total calories
Total fat	Ranged from 25-35% of total calories
Carbohydrate	Ranged from 50-60% of total calories
Water soluble fiber	10–25 g/d
Protein	Approximately 15% of total calories
Phytosterols (comprising plant sterols and stanols)	2 servings per day
Moderate intensity physical activity	Physical activity questionnaires (IPAQ) calculate 20 minutes at least three times per week.

Conclusion

Dyslipidemia is one of the major health problems and complications that PLHIV patients face today, affecting their quality of life. Adequate intake of soluble dietary fiber and supplementation has been shown to improve blood lipid profiles. Through MNT-based TLC diet intervention, dietitians can help PLHIV lower their TC and LDL levels. This is an opportunity for future research to investigate the effectiveness of combining soluble dietary fiber supplementation with MNT-based TLC diet intervention.

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