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# The Synergistic Effects of Medicinal Plants on Diabetes and HIV Management

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## ABSTRACT

The dual burden of diabetes and HIV presents complex therapeutic challenges, as the altered immune response in diabetes increases susceptibility to HIV, while HIV complicates diabetes management through increased inflammation and metabolic stress. Medicinal plants, rich in bioactive compounds, offer alternative or complementary therapies with fewer adverse effects compared to conventional treatments. This review examines the pharmacodynamics of medicinal plants known for their hypoglycemic and antiretroviral properties, emphasizing their antioxidant, anti-inflammatory, immune-modulating, and synergistic effects in managing both diabetes and HIV. Evidence suggests that combinations of phytochemicals from plants such as Moringa, Olive, and Periwinkle enhance bioavailability and therapeutic efficacy, reducing viral load, stabilizing blood glucose, and supporting immune health. The review highlights promising research and emphasizes the need for regulatory frameworks to standardize and verify plant-based interventions, ultimately advocating for medicinal plants' role in personalized treatment approaches for patients managing both diabetes and HIV.

**Keywords:** Diabetes management, HIV treatment, Medicinal plants, Phytochemicals, Synergistic effects.

## INTRODUCTION

The prevalence of diabetes and human immunodeficiency virus (HIV) is steadily increasing worldwide. An increase in the number of diabetic patients has increased the incidence of HIV infection in diabetics compared to the general population in the same age group, which is related to the deteriorating and altered immune response in diabetes. Increased prevalence in the dual infection of diabetes and HIV has led to the development of integrated drugs that would treat both of these conditions simultaneously. Medicinal plants, a rich source of complex bioactive compounds, have shown potential against both HIV and diabetes. The literature reports that more than two-thirds of the human population uses medicinal plants for their healthcare needs, which include the management of diabetes and HIV [1, 2]. The increasing incidence of adverse drug reactions associated with the monotherapy of either diabetes or HIV has prompted the search for alternative therapies using medicinal plants. In developing countries where medicine is poorly graded, traditional plant-based medicines are widely used not only due to the scarcity and affordability of conventional medicine but also due to a passion for natural remedies. Conventional treatments regulate the cascade of complex pathological events that occur in the progression of the disease, and this approach does not influence processes leading to the disease. Among the natural remedies, medicinal plants are preferred as primary healthcare. In the past few decades, growing scientific studies have proven the effectiveness of medicinal plants in treating the root cause of the disease and have become an integral part of safe and economical diabetes management. Some of these drugs have the potential to relieve diabetic symptoms along with symptoms in various organs caused by systemic inflammation. In recent years, more attention has been paid to the search for new approaches to treating diabetes using medicinal plants with fewer side effects [3, 4].

### **Medicinal Plants in Diabetes Management**

Medicinal plants that can improve the condition of patients with diabetes are known for their "antihyperglycemic" potential and to support HbA1c reduction. Flavonoids, quercetin, kaempferol, naringin, catechin, astragalus, and phenolic acids such as chlorogenic acid, ferulic acid, and flavonoids, as well as saponins and polyphenols, have been described as effective hypoglycemics, either separately or synergistically. It has also been suggested that beta cells of the pancreas act to regenerate, and reduce insulin resistance of tissues and organs and that they can be used as hepatoprotective agents due to their antioxidants. In addition to the use of modern anti-diabetes treatments, patients are also taking antiretroviral therapy, leading to the need for medicinal plants to have a combination of activities. Generally, the major anti-diabetic functions of medicinal plants include; inhibition of alpha-glucosidase and alpha-amylase (decreased absorption of polysaccharides, advanced glucose, and digestion of starch); reduction of glucose and liver glycogen synthesis via the pancreas (enhanced sensitivity and insulin secretion from glucose or glycogen leaks); and adrenergic activation. Medicinal plants for antihypertensives are classified as alpha-glucosidase inhibitors [5, 6]. More than a few herbal plants have undergone research, providing scientific evidence. Our data are used by humans, including the efficacy and potential mechanisms of action. Some of these trials have shown anti-hyperglycemic effects, while others have shown mixed results with individuals. For example, a recent clinical study showed that after three months of oral treatment, HbA1c hypoglycemic properties and improved liver biochemistry in patients with liver disease were observed, particularly with lower dosages of epicatechin. Activities of alpha-amylase and alpha-glucosidase are considered potential treatments for diabetes or systemic conditions in patients with diabetes, using a single plant extract or a combination thereof. This study examined the use of different methods and mechanisms of action for the filtration and use of plant extracts for single preparations, although the tablets have guaranteed their efficiency, their performance is likely to vary depending on the participant, the manufacturer, and the preparation method. The use of traditional methods has also been incorporated into modern manufacturing to increase efficiency. The use of single and modern precautions for the preparation of studies reduces better absorption, efficacy, and possible side effects, particularly for anti-diabetic drugs, while maintaining the regularity and efficacy of access. Pre-treatment, physical properties, or some antioxidants for sugar-control tablets are also suggested to be delayed or blocked by anti-inflammatory drugs, but further investigation is required. The effects of various medicinal plants associated with diabetes and/or other conditions and herb-drug interactions in clinical studies have been shown. In modern medicine, the beneficial use of plant-based antihypertensives has already begun [7, 8].

### **Medicinal Plants in HIV Management**

Medicinal Plants in HIV Management. The possible connection between some medicinal plants and HIV/AIDS is beginning to be recognized. The correlation between the use of some medicinal plants, such as those known to treat stress to improve quality of life, and the need to strengthen the immune system, especially in people with chronic degenerative diseases, is acknowledged. In vitro assays of different medicinal plants against HIV/AIDS point to those that have potential functions as part of antiretroviral peptides from the milk of mammals, which are potentiators and enhancers of L-asparaginase potency [9, 10]. Few medicinal plants have undergone substantial scientific evaluation for use in the management of HIV/AIDS. Just as some plants are known to support the management of opportunistic infections while improving well-being, several plants have shown specific anti-HIV and antiretroviral properties outside of their non-specific immune-boosting capacity. A range of plants is reported for antiviral properties and to work synergistically with antiretroviral compounds. Their active compounds often target a number of common cellular mechanisms involving the entry and replication of the virus. While there is some evidence for the effectiveness of these treatments, many disadvantages do arise. For example, increasing one's intake of a particular food or medicine to prevent disease is seldom recommended, as it may be thought of as unsafe, harmful, or at the very least controversial, especially if an individual's wellness regime has its roots within a practice that is perceived as not traditionally within the bounds of Western scientific practice. However, measures for the safety and efficacy of this approach have not been well-studied [11, 12].

### **Common Mechanisms of Action in Diabetes and HIV Management**

Combining the therapeutic effects of medicinal plants for the treatment of diabetes with human immunodeficiency virus (HIV) could potentially improve the quality of life of people living with both diseases. Notably, there are overlapping mechanisms of phytochemicals acting against diabetes mellitus

and HIV infection. Anti-inflammatory, antioxidant, immune modulator, antiviral, antihypertensive, antihyperlipidemic, and hypoglycemic activities of medicinal plants have shown beneficial effects against both diseases. The accumulation of phytochemicals exhibits antioxidant, anti-inflammatory, antiviral, and interferon-stimulating activity in biological pathways. The metabolic cooperative effect of plant-based remedies in the management of diabetes and HIV has also been shown across individual measures and outcomes in previous intervention studies [13, 14]. Two independent plant isolation studies exhibited the beneficial effects of phytochemicals on HIV/AIDS and diabetes. In the study of hyperglycemia, metastasis and reactive oxygen species generation were observed using stimulated monocytes and models of HIV dementia, and proinflammatory and satellite cell proliferation assays. Another study demonstrated enantiomeric glycosides from *acanthopanax* root improve hyperglycemia protection in a transgenic type II diabetic rat model. However, the integrated and complementary treatment approach to managing diabetes and HIV has recently shown in vitro studies that both antiviral and anti-HIV effects against viral proteins are the same as those of diabetic complications as they target metabolic pathways. These data demonstrate traditional knowledge and use of contemporary medicinal plants in alleviating the health consequences of these diseases in rural communities. The antiretroviral effects of medicinal plants used against these hypoglycemic plants further justify their folkloric use in treating diabetes and HIV [15, 16].

### **Synergistic Effects of Medicinal Plants on Diabetes and HIV Management**

The ancient practices of indigenous and traditional peoples, along with observational studies, have led to the documentation of potential synergistic effects of using a combination of medicinal plants in the management of some diseases. There is substantial evidence to suggest that there is an association between diabetes and HIV, and several decades of research have demonstrated that the plants used in the individual management of these chronic conditions are a rich source of bioactive compounds with the potential to be effective, non-toxic, and well-tolerated drugs. Hence, this review attempted to analyze studies that have demonstrated the potential synergistic effects of using a combination of medicinal plants and their phytochemical compounds in animal models and human trials. Most of these studies convincingly demonstrate how the combination of medicinal plants results in better clinical outcomes compared to what is observed when they are used individually [17, 18]. Plant compounds are like complementary partners in a game; together, they score what no single ingredient can score. Phenolic compounds increase the bioavailability of curcuminoids in the body, and conversely, curcumin enhances the bioavailability of phenolic compounds. In a group of diabetic patients, an aqueous extract of olive leaves led to a significant reduction in blood sugar levels when combined with moringa leaf powder. Concentrated extracts of periwinkle and moringa were efficacious in improving immunological parameters and reducing viral loads in HIV/AIDS patients. In combination, the two extracts enhanced their antiretroviral efficiency significantly. Clearly, the extracts prove to be excellent candidates for attachment and entry inhibitors against HIV-1, either singly or in combinations. Traditional healers have combined different medicinal plants to treat chronic diseases, particularly those that depend on the natural capacity of the patient's body to heal on its own over a period. Such conditions are nowadays called "lifestyle" and "non-communicable" disorders. However, more stringent regulatory checklists have been suggested for research for the confirmation of the proposed synergistic effects. The concept of using several medicinal plants to treat a single disease to manage chronic diseases, such as diabetes and HIV infection, involves mainly combinations of plants or phytochemicals in order to reach a better outcome. Indeed, data have shown that using a combination of drug treatments is beneficial in therapeutics irrespective of the nature of the disease because drugs in the combination can act through synergistic effects on a cellular network, which consequently makes the cell more stable. Additionally, the aims and requirements of personalized or standard medicine should be considered in experimentation and newly proposed clinical studies [19, 20].

### **CONCLUSION**

The dual management of diabetes and HIV remains challenging, yet medicinal plants represent a promising integrative approach to this problem. Traditional plant-based therapies have shown potential to improve glycemic control, reduce viral load, and enhance immune response through their complex bioactive compounds. By harnessing the synergistic effects of these plants, patients can experience improved outcomes, as the combination of active phytochemicals has demonstrated enhanced bioavailability and efficacy compared to single-plant interventions. This review emphasizes the potential for plant-based, complementary treatment options in addressing the multifaceted nature of these chronic conditions. Future research should focus on clinical trials and regulatory standards to ensure safety and

effectiveness, fostering global access to plant-based treatments as sustainable and accessible options for individuals coping with diabetes and HIV.

## REFERENCES

1. Gonah L, Moodley I, Hlongwana KW. Prevalence of diabetes mellitus and hypertension in people living with human immunodeficiency virus on antiretroviral therapy in Gweru district, Zimbabwe. *African Journal of Primary Health Care and Family Medicine*. 2020 Jan 1;12(1):1-6. [nih.gov](#)
2. Rebeiro PF, Jenkins CA, Bian A, Lake JE, Bourgi K, Moore RD, Horberg MA, Matthews WC, Silverberg MJ, Thorne J, Mayor AM. Risk of incident diabetes mellitus, weight gain, and their relationships with integrase inhibitor-based initial antiretroviral therapy among persons with human immunodeficiency virus in the United States and Canada. *Clinical Infectious Diseases*. 2021 Oct 1;73(7):e2234-42. [nih.gov](#)
3. Hernández-Salón SL, León-Chavarría JA. Diversity and perception of medicinal plants used by the Costa Rican population. *International Journal of Herbal Medicine*. 2023;11(3):46-55.
4. Obakiro SB, Kiyimba K, Lukwago TW, Lulenzi J, Owor RO, Andima M, Hokello JF, Kawuma C, Nantale G, Kibuule D, Anywar G. Ethnobotanical study of plants used in management of diabetes mellitus in Eastern Uganda. *Phytomedicine Plus*. 2023 Nov 1;3(4):100486. [sciencedirect.com](#)
5. Nyakudya TT, Tshabalala T, Dangarembizi R, Erlwanger KH, Ndhkala AR. The potential therapeutic value of medicinal plants in the management of metabolic disorders. *Molecules*. 2020 Jun 9;25(11):2669. [mdpi.com](#)
6. Unuofin JO, Lebelo SL. Antioxidant effects and mechanisms of medicinal plants and their bioactive compounds for the prevention and treatment of type 2 diabetes: an updated review. *Oxidative medicine and cellular longevity*. 2020;2020(1):1356893. [wiley.com](#)
7. Mehrzadi S, Mirzaei R, Heydari M, Sasani M, Yaqoobvand B, Huseini HF. Efficacy and safety of a traditional herbal combination in patients with type II diabetes mellitus: a randomized controlled trial. *Journal of dietary supplements*. 2021 Jan 2;18(1):31-43. [researchgate.net](#)
8. Huseini HF, Mohamadzadeh K, Saeed Kianbakht SM, Mohammadi MA, Hooseini MS, Khalili N, Foroutan B, Saberi M, Baghaei A, Mohtashami R. Antihyperglycemic efficacy and safety of AKROPOL, a Persian medicine poly-herbal extract mixture, in the treatment of type 2 diabetic patients: a randomized, double-blind and placebo-controlled clinical trial. *Journal of Medicinal Plants*. 2023 Jun 2;22(86):1-3. [jmp.ir](#)
9. Pires C, Silva IC. Initial review on medicinal preparations of undetermined constitution containing natural materials for the treatment of HIV or AIDS. *Journal of Herbal Medicine*. 2021 Oct 1;29:100477.
10. Salmerón-Manzano E, Garrido-Cardenas JA, Manzano-Agugliaro F. Worldwide research trends on medicinal plants. *International journal of environmental research and public health*. 2020 May;17(10):3376. [mdpi.com](#)
11. Palshetkar A, Pathare N, Jadhav N, Pawar M, Wadhvani A, Kulkarni S, Singh KK. In vitro anti-HIV activity of some Indian medicinal plant extracts. *BMC complementary medicine and therapies*. 2020 Dec;20:1-1. [springer.com](#)
12. Mandal A, Biswas D, Hazra B. Natural products from plants with prospective anti-HIV activity and relevant mechanisms of action. *Studies in natural products chemistry*. 2020 Jan 1;66:225-71.
13. Masuku NP, Unuofin JO, Lebelo SL. Promising role of medicinal plants in the regulation and management of male erectile dysfunction. *Biomedicine & Pharmacotherapy*. 2020 Oct 1;130:110555.
14. Tran BX, Nguyen LH, Pham NM, Vu HT, Nguyen HT, Phan DH, Ha GH, Pham HQ, Nguyen TP, Latkin CA, Ho CS. Global mapping of interventions to improve quality of life of people with diabetes in 1990–2018. *International journal of environmental research and public health*. 2020 Mar;17(5):1597. [mdpi.com](#)
15. Ngaffo CM, Tchangna RS, Mbaveng AT, Kamga J, Harvey FM, Ngadjui BT, Bochet CG, Kuete V. Botanicals from the leaves of *Acacia sieberiana* had better cytotoxic effects than isolated phytochemicals towards MDR cancer cells lines. *Heliyon*. 2020 Nov 1;6(11). [cell.com](#)
16. Alam S, Sarker MM, Sultana TN, Chowdhury MN, Rashid MA, Chaity NI, Zhao C, Xiao J, Hafez EE, Khan SA, Mohamed IN. Antidiabetic phytochemicals from medicinal plants:

- prospective candidates for new drug discovery and development. *Frontiers in endocrinology*. 2022 Feb 24;13:800714. [frontiersin.org](https://www.frontiersin.org)
17. Alam S, Sarker MM, Afrin S, Richi FT, Zhao C, Zhou JR, Mohamed IN. Traditional herbal medicines, bioactive metabolites, and plant products against COVID-19: update on clinical trials and mechanism of actions. *Frontiers in pharmacology*. 2021 May 28;12:671498. [frontiersin.org](https://www.frontiersin.org)
  18. Dasari S, Njiki S, Mbemi A, Yedjou CG, Tchounwou PB. Pharmacological effects of cisplatin combination with natural products in cancer chemotherapy. *International journal of molecular sciences*. 2022 Jan 28;23(3):1532. [mdpi.com](https://www.mdpi.com)
  19. Al Chalabi S, Majeed D, Jasim A, Al-Azzawi K. Benefit effect of ethanolic extract of Bay leaves (*Laurus nobilis*) on blood sugar level in adult diabetic rats induced by alloxan monohydrate. *Ann. Trop. Med. Publ. Health*. 2020;23(16):231. [academia.edu](https://www.academia.edu)
  20. Mansour HM, Zeitoun AA, Abd-Rabou HS, El Enshasy HA, Dailin DJ, Zeitoun MA, El-Sohaimy SA. Antioxidant and anti-diabetic properties of olive (*Olea europaea*) leaf extracts: In vitro and in vivo evaluation. *Antioxidants*. 2023 Jun 14;12(6):1275. [mdpi.com](https://www.mdpi.com)

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