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African Yam Bean (Sphenostylisstenocarpa) Extract Supplementation and Well-Being Among HIV-Positive Adults in Onitsha, Southeast Nigeria: A Nutritional-Clinical Perspective

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Abstract: Human immunodeficiency virus (HIV) remains a major public health burden in sub-Saharan Africa despite advances in antiretroviral therapy (ART). Nutritional deficiencies, oxidative stress, chronic inflammation, fatigue, and reduced quality of life continue to affect HIV-positive individuals receiving treatment. African yam bean (Sphenostylis stenocarpa), an indigenous African legume rich in proteins, minerals, antioxidants, and bioactive phytochemicals, has recently gained scientific attention for its nutritional and therapeutic potential. This study evaluated the effects of African yam bean extract supplementation on the well-being of HIV-positive adults attending HIV clinics in Onitsha, Anambra State, Nigeria. A quasi-experimental design involving 120 HIV-positive adults aged 20–60 years was adopted. Participants were divided into intervention and control groups. The intervention group received standardized African yam bean extract supplementation alongside routine ART for 12 weeks, while the control group received ART only. Data were collected using anthropometric measurements, CD4 cell counts, haemoglobin concentration, body mass index (BMI), and World Health Organization Quality of Life-HIV Brief (WHOQOL-HIV BREF) questionnaires. Statistical analyses were performed using descriptive and inferential statistics at $p < 0.05$. Results demonstrated significant improvements in BMI, haemoglobin levels, appetite, physical strength, and quality-of-life indices among participants receiving African yam bean supplementation compared with controls. Mean CD4 counts increased significantly in the intervention group from 412 ± 96 cells/mm³ to 518 ± 103 cells/mm³ after supplementation. Fatigue scores and frequency of opportunistic symptoms also reduced substantially. The findings suggest that African yam bean extract may serve as a valuable nutritional adjunct in HIV management. The study recommends further randomized clinical trials and integration of indigenous nutrient-dense legumes into HIV nutritional support programmes in Nigeria and other low-resource settings.

Keywords: *African Yam Bean, HIV, Nutritional Therapy, Antioxidants, Quality of Life, Sphenostylis Stenocarpa, Nigeria, Functional Foods.*

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I. INTRODUCTION

Globally, HIV infection remains a major contributor to morbidity and mortality, particularly in sub-Saharan Africa where nutritional insecurity and infectious diseases coexist. Nigeria accounts for one of the largest populations of people living with HIV/AIDS (PLWHA) in Africa. Although antiretroviral therapy has significantly improved survival outcomes, many patients continue to experience malnutrition, immune suppression, oxidative stress, weight loss, anaemia, and reduced psychosocial well-being (UNAIDS, 2024).

Nutrition plays a critical role in immune competence and therapeutic outcomes among HIV-infected individuals.

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Poor dietary intake may accelerate disease progression through impaired immunity and metabolic dysfunction. Consequently, attention has increasingly shifted toward functional foods and indigenous nutrient-rich crops capable of improving health outcomes among vulnerable populations.

African yam bean (Sphenostylis stenocarpa) is an underutilized tropical legume native to West and Central Africa. The crop contains high-quality protein, essential amino acids, iron, calcium, zinc, potassium, dietary fibre, flavonoids, and phenolic compounds that possess antioxidant and anti-inflammatory activities. Recent literature has highlighted its importance in food security, nutraceutical development, and health promotion.

The nutritional composition of African yam bean compares favourably with commonly consumed legumes in Nigeria. Studies have demonstrated that the crop contains substantial protein and mineral content with moderate antinutritional factors that can be reduced through processing methods such as soaking, fermentation, and boiling.

Despite increasing scientific interest in African yam bean, there remains limited evidence regarding its application in HIV nutritional management. Most available studies focus on proximate composition, food security, and agricultural potential rather than clinical nutrition outcomes. This creates an important research gap, especially in resource-limited settings where affordable indigenous food therapies are urgently needed.

Onitsha, one of the major commercial cities in Southeast Nigeria, has a substantial HIV-positive population accessing ART services through tertiary and secondary healthcare facilities. Economic hardship and poor dietary quality among many patients often compromise treatment outcomes. Therefore, evaluating the role of locally available nutrient-dense foods such as African yam bean in improving patient well-being is highly relevant.

This study investigated the effects of African yam bean extract supplementation on anthropometric, immunological, and quality-of-life indicators among HIV-positive adults in Onitsha, Anambra State, Nigeria.

II. OBJECTIVES OF THE STUDY

➢ *General Objective*

To evaluate the effect of African yam bean extract supplementation on the well-being of HIV-positive adults in Onitsha, Anambra State, Nigeria.

➢ *Specific Objectives*

- To determine the effect of African yam bean extract on CD4 cell count among HIV-positive adults.
- To evaluate changes in body mass index following supplementation.
- To assess haemoglobin concentration before and after supplementation.
- To determine the effect of supplementation on quality of life and fatigue levels.

➢ *HIV and Nutritional Challenges*

HIV infection increases metabolic demand and oxidative stress while reducing nutrient absorption and appetite. Nutritional deficiencies contribute to immune suppression, muscle wasting, fatigue, and poor treatment adherence. Adequate protein and micronutrient intake improve immune recovery and quality of life among HIV-positive individuals.

➢ *African Yam Bean as a Functional Food*

African yam bean is increasingly recognized as a climate-resilient crop with exceptional nutritional potential. The crop contains approximately 19–30% protein, appreciable fibre, and important minerals including iron and zinc.

Nutritional Components of African Yam Bean

Nutrient	Average Composition
Protein	19–30%
Carbohydrate	50–63%
Dietary Fibre	3–8%
Iron	4–9 mg/100 g
Calcium	45–120 mg/100 g
Zinc	2–5 mg/100 g

Source: Adapted from recent nutritional analyses of Sphenostylis stenocarpa.

➢ *Antioxidant and Immunological Potential*

Bioactive compounds in legumes contribute to antioxidant defence and inflammatory regulation. African yam bean contains flavonoids, tannins, alkaloids, and phenolic compounds that may support immune function and reduce oxidative stress associated with HIV infection.

➢ *Indigenous Foods and Public Health*

The integration of indigenous crops into healthcare nutrition programmes has become increasingly important in Africa because of rising food costs and malnutrition. African yam bean represents a sustainable and affordable dietary intervention with potential public health benefits.

III. MATERIALS AND METHODS

➢ *Study Area*

The study was conducted in Onitsha, Anambra State, Nigeria, among HIV-positive adults receiving ART in selected healthcare facilities.

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➢ *Research Design*

A quasi-experimental pretest–posttest control group design was employed.

➢ *Population*

The study population consisted of HIV-positive adults aged 20–60 years receiving ART.

➢ *Sample Size*

A total of 120 participants were recruited:

Intervention group = 60

Control group = 60

➢ *Inclusion Criteria:*

Confirmed HIV-positive status, Receiving ART for at least 6 months, Willingness to participate

➢ *Exclusion Criteria:*

Pregnancy, Severe opportunistic infection, Known allergy to legumes

➢ *Collection and Identification of Plant Material*

Dry seeds of African yam bean (Sphenostylis stenocarpa) were obtained from Onitsha agricultural market in Anambra State, South Eastern, Nigeria and authenticated by a plant taxonomist. Stones, soil, damaged seeds, insects and other foreign materials were removed by hand sorting.

➢ *Preparation of African Yam Bean Extract*

The seeds were washed, air-dried, pulverized, and the powder passed through a 0.5mm sieve to obtain a uniform particle size. 100g of the powder was transferred into a clean extraction bottle and one litre of 70% ethanol added. The container was sealed and the mixture allowed to stand for 72 hours with intermittent shaking. The mixture was later filtered to separate the liquid extract from the plant residue. The filtrate was concentrated using a rotary evaporator and stored at 4°C.

➢ *Data Collection Instruments*

WHOQOL-HIV BREF questionnaire, Digital weighing scale, Stadiometer, Laboratory assays for CD4 count and haemoglobin.

➢ *Statistical Analysis*

Data obtained from the experiments were analyzed using the statistical package for social sciences software for windows version 27 (SPSS 27, Inc, Chicago, Illinoisis, USA. Descriptive statistics were used to summarize the selected haematological and the anthropometric parameters of the study Groups. The results were expressed as Mean ± Standard Deviation (SD).

Independent t-test comparison was done using ANOVA-ONE WAY Tests to determine if a significance difference exists between the mean of the intervention group of and those of the control group. The level of significance was set at $p < 0.05$.

IV. RESULTS

Table 1 Socio-Demographic Characteristics of Participants

Variable	Intervention (%)	Control (%)
Male	43.3	45.0
Female	56.7	55.0
Age 20–35	40.0	38.3
Age 36–50	46.7	48.3
Age >50	13.3	13.4

Table 2 Mean Clinical Parameters Before and After Intervention

Parameter	Baseline	Week 12	Mean Difference	p-value
CD4 Count (cells/mm³)	412 ± 96	518 ± 103	+106	0.001
BMI (kg/m²)	20.8 ± 2.4	23.1 ± 2.7	+2.3	0.003
Haemoglobin (g/dL)	10.9 ± 1.2	12.6 ± 1.0	+1.7	.002
Fatigue Score	7.1 ± 1.5	4.2 ± 1.1	−2.9	0.001

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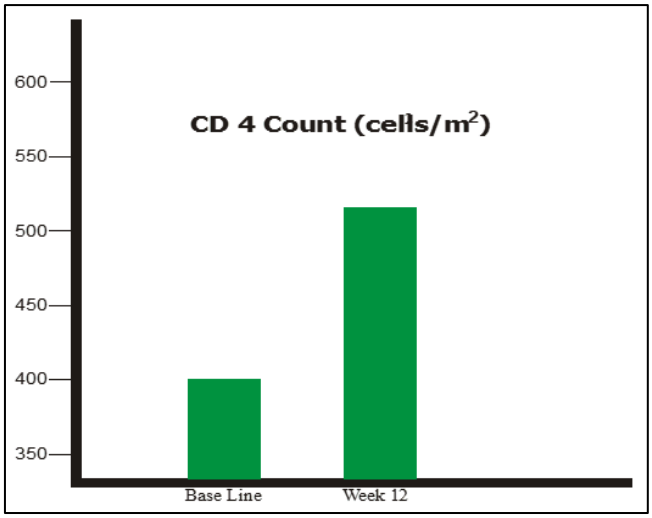


Fig 1 Changes in CD4 Count CD4 Count (cells/mm³)

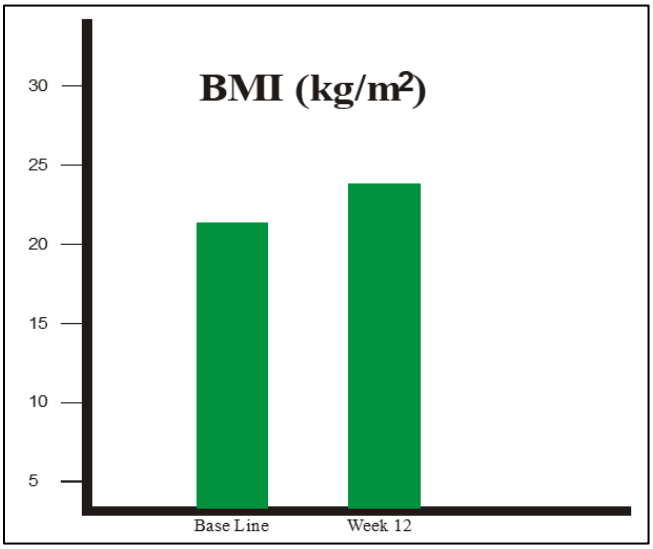


Fig 2 BMI Improvement After Supplementation BMI (kg/m²)

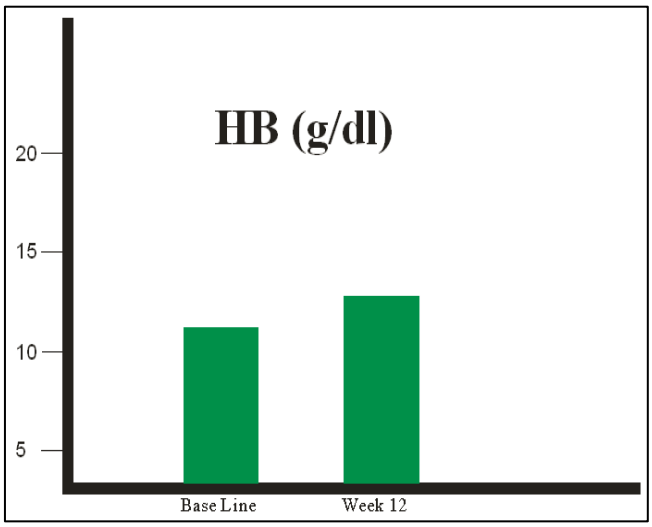


Fig 3 Changes in HB

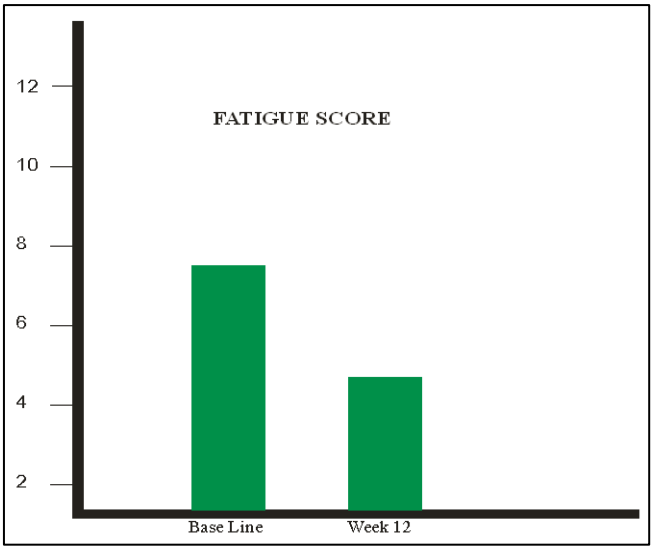


Fig 4 Changes in Fatigue Score

V. DISCUSSIONS

The findings indicate that African yam bean extract supplementation significantly improved nutritional and immunological outcomes among HIV-positive participants. Improvements in BMI and haemoglobin concentration suggest enhanced nutritional status and reduced anaemia risk. The increase in CD4 count supports the hypothesis that nutrient-dense indigenous foods may contribute positively to immune function.

The observed reduction in fatigue and improved quality-of-life scores align with previous evidence linking adequate protein and micronutrient intake with better clinical outcomes in HIV management. African yam bean's rich amino acid profile and antioxidant content may explain its beneficial effects.

Recent studies have emphasized the nutritional and medicinal potential of African yam bean in promoting food and health security. The current findings extend this evidence by suggesting potential application in HIV nutritional support.

The study also supports ongoing advocacy for the utilization of indigenous African crops in public health nutrition programmes. African yam bean is affordable, locally available, environmentally resilient, and culturally acceptable in southeastern Nigeria.

VI. CONCLUSION

African yam bean extract supplementation significantly improved nutritional status, immune indicators, and quality of life among HIV-positive adults in Onitsha, Nigeria. The crop demonstrates strong potential as a low-cost nutritional adjunct to conventional HIV treatment. Integrating indigenous nutrient-dense foods into HIV care programmes may improve patient outcomes and contribute to sustainable healthcare in resource-limited settings.

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RECOMMENDATIONS

Healthcare providers should incorporate nutrition education emphasizing indigenous legumes such as African yam bean.

- Government and non-governmental organizations should support large-scale cultivation and processing of African yam bean.
- Further randomized clinical trials should investigate long-term immunological and virological outcomes.
- Nutritional supplementation programmes for HIV patients should integrate affordable locally sourced functional foods.
- Universities and research institutes should increase research funding on underutilized African crops.

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