Synergistic Effect of Unripe Plantain and Garden Egg Extract on Postprandial Blood Glucose in Diabetes Mellitus Wistar Rats

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Certification

This is to certify that **Lydia Tolulope AYANKOSO** with matriculation number **LCU/PG/006325** carried out this research work titled "Synergistic Effect of Unripe Plantain and Garden Egg Flour on Postprandial Blood Glucose in Diabetes Mellitus Wistar Rats" in the Department of Human Nutrition and Dietetics, Faculty of Basic Medical and Health Sciences**,** Lead City University, Ibadan, Oyo state, for the award of Master Degree (M.Sc) in Human Nutrition and Dietetics and that this has not been previously submitted.

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Dedication

This research is dedicated to God almighty, whose wisdom, strength, and grace made this study possible.

Acknowledgement

My sincere gratitude goes to the entire Lead City University, Ibadan and school library for providing the necessary learning environment for me to partake in this program.

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Even though the above mentioned institutions and persons have assisted in the process of this research work, I alone stand responsible for the errors, if any, found in the work.

Abstract

Diabetes mellitus is a growing global health challenge requiring safe, accessible, and effective strategies for blood glucose control. Conventional pharmacological treatments, though effective, often pose risks such as drug-induced hypoglycemia, prompting interest in functional foods with antidiabetic potential. This study evaluated the synergistic antihyperglycemic effects of unripe plantain (*Musa paradisiaca*) and garden egg (*Solanum melongena*) flours in streptozotocin (STZ) induced diabetic rats, to develop a natural, dietary based therapy comparable to metformin. The research addressed a critical gap by investigating the combined effects of these two functional foods rather than their individual impacts, applying the nutritional synergy and glucose homeostasis theories to explain their interaction in regulating blood glucose levels. Forty-two Wistar rats were divided into six groups (n=7): normal control, negative control, metformin-treated (500 mg/kg), and three treatment groups administered 25%, 50%, and 100% formulations of the bi-herbal extract. Type 2 diabetes was induced using STZ (38 mg/kg body weight), and fasting blood glucose, body weight, and biochemical parameters were measured weekly for 28 days. Data were analyzed using one-way ANOVA with significance set at $p<0.05$. Results showed persistent hyperglycemia in untreated diabetic rats (291.70 ± 30.93 to 583.00 ± 17.00 mg/dL). In contrast, rats treated with bi-herbal formulations exhibited significant, dose-dependent reductions in glucose levels 25 mg/kg (264.30 ± 14.11 to 73.50 ± 6.50 mg/dL), 50 mg/kg (296.70 ± 13.91 to 72.00 ± 5.00 mg/dL), and 100 mg/kg (294.30 ± 13.93 to 71.50 ± 7.50 mg/dL) comparable to metformin-treated rats ($p<0.001$). The treatment also improved glucose tolerance, stabilized liver enzyme activities, and enhanced body weight recovery. In conclusion, combined unripe plantain and garden egg flours exhibited potent antihyperglycemic and hepatoprotective effects. The study recommends clinical trials and bioactive compound isolation to validate and optimize their use as safe, functional dietary therapies for diabetes management.

Keywords: Unripe plantain, Garden egg, Blood glucose, Diabetes mellitus, Bi-herbal formulation.

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List of Acronyms

International Diabetes Federation	(IDF)
Adenosine Triphosphate	(ATP)
Glycemic Index	(GI)
Diabetes Mellitus	(DM)
High-Density Lipoprotein	(HDL)
Low-Density Lipoprotein	(LDL)
Aspartate Aminotransferase	(AST)
Alanine Aminotransferase	(ALT)
Alkaline Phosphatase	(ALP)
Glucose Transporter	(GLUT)
American Diabetes Association	(ADA)
Estimated Average Glucose	(eAG)
Glycemic Load	(GL)
Cardiovascular Disease	(CVD)
National Health Service	(NHS)
Physical Activity Levels	(PALs)
Physical Activity Energy Expenditure	(PAEE)
Metabolic Equivalents	(METs)
Body Mass Index	(BMI)
Upper Respiratory Tract Infections	(URTIs)
World Health Organization	(WHO)
International Association for the Study of Obesity	(IASO)
National Institute for Clinical Excellence	(NICE)
Streptozotocin	(STZ)
Completely Randomized Design	(CRD)
Intraperitoneally	(IP)
Fasting Blood Glucose	(FBG)
Postprandial Blood Glucose	(PPBG)
Total Cholesterol	(TC)
Triglycerides	(TG)
Standard Deviation	(SD)
Glucose Tolerance Test	(GTT