ANTIDIABETIC POTENTIAL OF *Tragia involucrata* Linn IN ALLOXAN-INDUCED DIABETIC SWISS ALBINO MICE

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DECLARATION

This thesis is my original work and has not been presented for a degree award in any other University.

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DEDICATION

This thesis is dedicated to my mother and siblings for their unwavering support, love and encouragement. Your sacrifices and belief in me have been my strength. I also dedicate this work to my colleagues in the Department of Pure and Applied Sciences at the Technical University of Mombasa for enriching my academic journey.

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ABSTRACT

Diabetes mellitus (DM) is a major global health challenge associated with chronic hyperglycemia, which arises from systemic failure of insulin secretion, action or both. Although conventional treatments are available, many have important adverse effects and are unavailable, especially in developing regions. Hence, there is a critical need for such therapies to be obtained from natural sources. This study evaluated the phytochemical composition, antidiabetic efficacy, lipid profile and toxicity effects of dichloromethane (DCM) leafy extracts of *Tragia involucrata* Linn (*T. involucrata*) in alloxan-induced diabetic Swiss albino mice. *T. involucrata* is a plant traditionally used by the Abagusii community of Kenya for management of diabetes and inflammation. GC-MS profiling revealed the presence of bioactive compounds including phytol, beta-sitosterol, and squalene, known to influence glucose and lipid metabolism through antioxidant and receptor-mediated pathways. Extract treatment led to significant glycemic control and improved lipid profiles, marked by reduced total cholesterol, triglycerides and LDL-C and elevated HDL-C. Acute and subacute toxicity assessments showed no mortality or behavioral or systemic toxicity across doses up to 2000 mg/kg bw. Body and organ weight stability, alongside normal biochemical markers, indicated metabolic tolerance. These results validate the potential of *T. involucrata* as a viable plant-based therapeutic agent for the management of diabetes and its associated dyslipidemia. The results warrant further investigations including clinical trials to evaluate the therapeutic potential and to identify lead compounds that are crucial for drug discovery and development.

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AGEs	Advanced Glycation End Products
ANOVA	Analysis of Variance
CVDs	Cardiovascular Diseases
DCM	Dichloromethane
DM	Diabetes Mellitus
ELISA	Enzyme-Linked Immunosorbent Assay
GC-MS	Gas Chromatography-Mass Spectrometry
GLUT4	Glucose Transporter Type 4
HDL-C	High-Density Lipoprotein Cholesterol
IDF	International Diabetes Federation
IRS	Insulin Receptor Substrates
KATP	ATP-sensitive Potassium Channels
LDL	Low-Density Lipoprotein
LDL-C	Low-Density Lipoprotein Cholesterol
MAPK	Mitogen-Activated Protein Kinase
MODY	Maturity-Onset Diabetes of the Young
NF-κB	Nuclear Factor kappa-light-chain-enhancer of activated B cells
OECD	Organization for Economic Co-operation and Development
PI3K	Phosphatidylinositol-3-Kinase
RNS	Reactive Nitrogen Species
ROS	Reactive Oxygen Species
SOD	Superoxide Dismutase
T2DM	Type 2 Diabetes Mellitus
TC	Total Cholesterol
TG	Triglycerides
WHO	World Health Organization