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# Therapeutic Potential of Isoflavonoid-Rich Magneto-Primed Soybean Extract: Enhancing Insulin Sensitivity and Kidney Function through DPP-IV and SGLT-2 Inhibition in a Diabetic Kidney Disease Model

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**Objectives :** Diabetic kidney disease (DKD), a major complication of diabetes, progresses to chronic kidney disease (CKD) and end-stage renal disease (ESRD), affecting approximately 40% of diabetics and often leading to dialysis or kidney transplantation. Dipeptidyl peptidase IV (DPP-IV) and sodium-glucose co-transporter-2 (SGLT-2) inhibitors have shown potential in preventing diabetic complications by reducing oxidative stress, supporting cardiovascular health, and modulating glucagon-like peptide-1 receptor (GLP-1R) expression. This study explores the therapeutic potential of the isoflavonoid-rich fraction of magneto-primed soybean extract, which contains natural DPP-IV and SGLT-2 inhibitors, in improving insulin sensitivity and kidney function in a DKD rat model.
**Methods :** DKD model was induced in rats using streptozotocin (40 mg/kg) and a high-fat diet. Biochemical, toxicological, and histological kidney assessments were conducted, focusing on SGLT-2 and DPP-IV inhibition. Key evaluations included HbA1c, insulin levels, GLP-1, and p-eIF2α, along with oxidative stress markers such as AMPK, PPARα, SOD, CAT, and GSH. Kidney function was assessed through serum creatinine, albumin-to-creatinine ratio, serum cystatin C, and blood urea nitrogen, while serum lipid profiles and proinflammatory markers (TNF-α, IL-6, adiponectin) were analysed. Kidney tissue histology further validated the findings.
**Results :** Diabetes induction was confirmed by HOMA-IR (2.8%) and HOMA sensitivity (43.9%). In vivo analysis showed significant SGLT-2 (63.5±2.7%) and DPP-IV (69.3±3.8%) inhibition. This led to AMPK and PPARα activation, reduced p-eIF2α, and significant ($P<0.05$) improvements in kidney function, insulin sensitivity, HbA1c, triglycerides, cholesterol, and oxidative stress markers compared to the DKD control group. The extract also enhanced antioxidant activity, reduced lipid peroxidation, improved kidney histoarchitecture, and lowered proinflammatory cytokine levels
**Conclusions :** The isoflavonoid-rich fraction of magneto-primed soybean extract exhibits strong therapeutic potential for managing DKD by improving kidney function, reducing inflammation, and enhancing insulin sensitivity, warranting further clinical investigation.