



Moringa oleifera, Lam. Extract as Therapy for Insulin Resistance Through Increasing Insulin and GLUT-2 Expression in Pancreatic Islet Cells of Metabolic Syndrome Rats Model



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Introduction

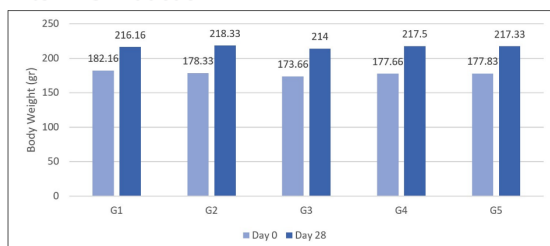
In metabolic syndrome (MS), insulin resistance and beta-cell damage due to oxidative stress play roles in the pathogenesis of type 2 diabetes mellitus. *Moringa oleifera* have shown antihyperglycemic, antioxidants, and anti-inflammatory activity to stimulate beta cell regeneration. This study aimed to analyze the effect of *Moringa oleifera*, Lam. roots extract on insulin and GLUT-2 expression of MS rats model.

Method

- Thirty male Wistar-strain rats were randomly assigned into five groups.
 - G1 (control) was fed only with a standard pellet for 56 days.
 - G2 (control negative), G3, G4, and G5 were fed with a high-fat diet for 24 days and streptozotocin-nicotinamide (STZ-NA) injection on the 25th day.
 - G3 was given 150mg/kgBW of *Moringa* roots extract for 28 days.
 - G4 was given 250mg/kgBW of *Moringa* roots extract for 28 days.
 - G5 was given 350mg/kgBW of *Moringa* roots extract for 28 days.
- Then rats were sacrificed, and the pancreatic tissues were taken for anti-insulin and anti-GLUT-2 antibodies staining.
- Insulin and GLUT-2 expression data were calculated by Intensity Distribution Score (IDS). The data were analyzed using the Kruskal-Wallis test followed by the Mann-Whitney post hoc test.

Result

Figure 1. Mean Body Weight of Rats Before and After MS Induction



Result

Figure 2. Mean Levels of MS Serum Parameters Day-0

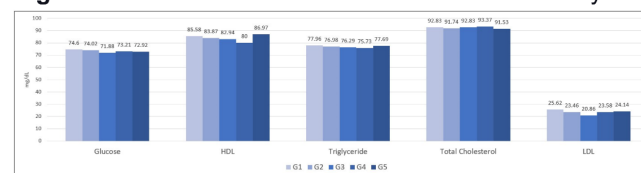
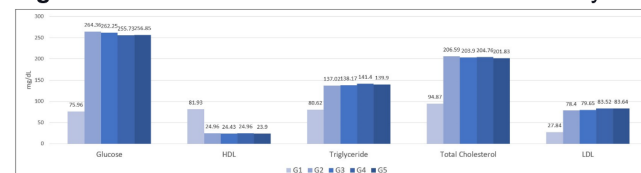
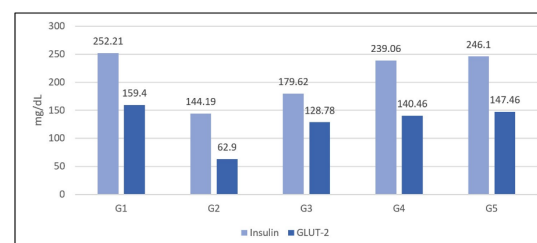


Figure 3. Mean Levels of MS Serum Parameters Day-28



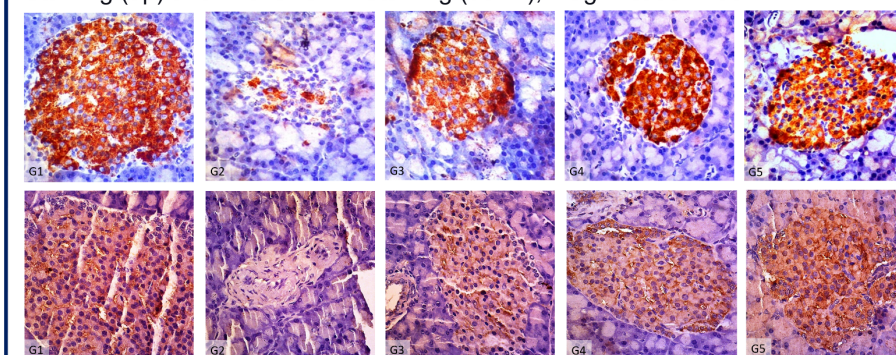
- In the present study, several criteria of MS were achieved. Figure 1 shows the increase (>8%) in body weight after high-fat diets and induction of STZ-NA. Figure 2 and 3 shows the value of MS parameters before and after MS induction.

Figure 4. Mean IDS on Insulin and GLUT-2 Expression of Rat Pancreatic Tissue



- Figure 4 shows the insulin and GLUT-2 expression were poor in control negative group (G2) and significantly increased with the *Moringa* treatment groups (G4 and G5).

Figure 5. Insulin and GLUT-2 Expression on Pancreatic Tissue with anti-Insulin Staining (up) and Anti-GLUT-2 Staining (down), Magnification 400x.



- Moringa oleifera*, Lam. roots extract at doses of 250 mg/kgBW (G4) and 350 mg/kgBW (G5) significantly increased the insulin and GLUT-2 expression of pancreatic islet cells in the Wistar rats model of metabolic syndrome ($p < 0.05$, respectively).

Conclusion

- This study showed that *Moringa oleifera*, Lam. roots extract increased the insulin and GLUT-2 expression in the metabolic syndrome rats model.
- It could be due to free radical scavenging and reactive oxidative stress-reducing ability by antioxidant properties of *Moringa*.

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