

Effect of *Ipomoea aquatica* ethanolic extract in streptozotocin (STZ) induced diabetic rats via ¹H NMR-based metabolomics approach

ABSTRACT

Background: *Ipomoea aquatica* (locally known as “kangkung”) has previously been reported to have hypoglycemic activities on glucose level in diabetes patients. However, the effect of *I. aquatica* ethanolic extract on the metabolites in the body has remained unknown. Purpose: This study provides new insights on the changes of endogenous metabolites caused by *I. aquatica* ethanolic extract and improves the understanding on the therapeutic efficacy and mechanism of *I. aquatica* ethanolic extract. Methods: By using a combination of ¹H nuclear magnetic resonance (NMR) with multivariate analysis (MVDA), the changes of metabolites due to *I. aquatica* ethanolic extract administration in obese diabetic-induced Sprague Dawley rats (OB+STZ+IA) were identified. Results: The results suggested 19 potential biomarkers with variable importance projections (VIP) above 0.5, which include creatine/creatinine, glucose, creatinine, citrate, carnitine, 2 oxoglutarate, succinate, hippurate, leucine, 1-methylnicotinamide (MNA), taurine, 3-hydroxybutyrate (3-HB), tryptophan, lysine, trigonelline, allantoin, formiate, acetoacetate (AcAc) and dimethylamine. From the changes in the metabolites, the affected pathways and aspects of metabolism were identified. Conclusion: *I. aquatica* ethanolic extract increases metabolite levels such as creatinine/creatinine, carnitine, MNA, trigonelline, leucine, lysine, 3-HB and decreases metabolite levels, including glucose and tricarboxylic acid (TCA) intermediates. This implies capabilities of *I. aquatica* ethanolic extract promoting glycolysis, gut microbiota and nicotinate/nicotinamide metabolism, improving the glomerular filtration rate (GFR) and reducing the β -oxidation rate. However, the administration of *I. aquatica* ethanolic extract has several drawbacks, such as unimproved changes in amino acid metabolism, especially in reducing branched chain amino acid (BCAA) synthesis pathways and lipid metabolism.

Keyword: ¹H NMR metabolomics; *Ipomoea aquatica*; Diabetes; Metabolites