

Anti-diabetic activity and metabolic changes induced by *Andrographis paniculata* plant extract in obese diabetic rats

ABSTRACT

Andrographis paniculata is an annual herb and widely cultivated in Southeast Asian countries for its medicinal use. In recent investigations, *A. paniculata* was found to be effective against Type 1 diabetes mellitus (Type 1 DM). Here, we used a non-genetic out-bred Sprague-Dawley rat model to test the antidiabetic activity of *A. paniculata* against Type 2 diabetes mellitus (Type 2 DM). Proton Nuclear Magnetic Resonance (¹H-NMR) spectroscopy in combination with multivariate data analyses was used to evaluate the *A. paniculata* and metformin induced metabolic effects on the obese and obese-diabetic (obdb) rat models. Compared to the normal rats, high levels of creatinine, lactate, and allantoin were found in the urine of obese rats, whereas, obese-diabetic rats were marked by high glucose, choline and taurine levels, and low lactate, formate, creatinine, citrate, 2-oxoglutarate, succinate, dimethylamine, acetoacetate, acetate, allantoin and hippurate levels. Treatment of *A. paniculata* leaf water extract was found to be quite effective in restoring the disturbed metabolic profile of obdb rats back towards normal conditions. This study shows the anti-diabetic potential of *A. paniculata* plant extract and strengthens the idea of using this plant against the diabetes. Further classical genetic methods and state of the art molecular techniques could provide insights into the molecular mechanisms involved in the pathogenesis of diabetes mellitus and anti-diabetic effects of *A. paniculata* water extract.

Keywords: *Andrographis paniculata*; Metabolomics; Diabetes; Obesediabetic rat; Type 2 DM; NMR