

Metabolomics approach to investigate the ergogenic effect of *Morinda citrifolia* L. leaf extract on obese Sprague Dawley rats

ABSTRACT

Introduction: Natural products are obtaining much acceptance as ergogenic aid, not only among athletes but also among the general population including people with excess body fat. Under normal circumstances, an obese person will have the desire and ability to exercise reduced; mainly because they are easily fatigued. Thus, they need to boost their energy production so that they can be more active and healthier.

Objective: In this present work, *Morinda citrifolia* L. leaf extract (MLE) which is believed to possess ergogenic property, was evaluated on its effect on an obese animal model using ¹H-NMR based metabolomics.

Material and methods: Rats were fed with high fat diet (HFD) for 12 weeks for obese development. Once this was achieved, all the rats underwent endurance exercise (forced swimming test) every 2 weeks for 8 weeks together with treatment. The time to exhaustion was recorded for each rat. Three different dosages of MLE: 50 mg/kg, 100 mg/kg and 200 mg/kg of body weight were used together with two positive controls: 5 mg/kg caffeine and 100 mg/kg green tea. Blood was collected before and after treatments for metabolomics study.

Results: Findings showed that feeding the rats at a dose of 200 mg/kg body weight MLE significantly prolonged the exhaustive swimming time of the rats, and altered the metabolites present in their serum. Discriminating metabolites involved were the product of various metabolic pathways, including carbohydrate, lipids metabolism and energy metabolism. Treatment with 200 mg/kg body weight MLE resulted in significant improvement in the metabolic perturbations where the proximity of the obese exercised treated group to that of normal exercised group in the partial least squares discriminant analysis score plot was observed.

Conclusion: The present work demonstrated ergogenic property of MLE based on the improved metabolic perturbation in exercised obese rats.

Keyword: ¹H-NMR; *Morinda citrifolia*; Ergogenic; Forced swimming test; Metabolomics