

The Role of Marijuana Nutraceuticals in Diabetes Care – The Evidence Revealed

Chair: *The Hon Henry Lowe*

Effect of Cannabinoids and Flavonoids from Cannabis on Glucose Uptake: Potential Treatments for Diabetes Type 2

Ngeh Toyang, Charah C Watson, Shelly-Ann Powell, Denise Daley, Henry IC Lowe

Diabetes Type 2 is an autoimmune disease characterized by defects in insulin secretion, resulting in hyperglycaemia. One of the hallmarks of Type 2 diabetes is decreased sensitivity of muscle and adipose cells to insulin. Compounds that increase the sensitivity of adipose cells to insulin may be useful in the treatment of diabetes and its complications. Medical cannabis use is surging in many countries and this age-old plant is touted to be a potential cure for several ailments including diabetes. Cannabinoids are the most known and researched chemical constituents of cannabis. While a number of studies have reported the beneficial effects of cannabidiol (CBD) and tetrahydrocannabinol (THC) on diabetes Type 2, other cannabinoids and cannabis metabolites have received little attention. In our preliminary acute glucose uptake assay, we found non-cannabinoid metabolite derivatives to be more active than the metabolites from cannabis. Of the cannabinoid group, only tetrahydrocannabinol (THC) was active, while CBD and cannabivarin (CBV) were inactive. Our studies revealed for the first time the acute glucose uptake enhancing potential of two new analogues derived from cannabis flavonoids and also suggest that although the cannabinoids are reported to be active or have preventive properties against diabetes Type 2, they may not be useful in controlling acute cases of hyperglycaemia.

The Potential Development of Diabetic Pharmaceuticals, Nutraceuticals and Functional Foods from Hypoglycaemic Compounds Isolated from *Eucalyptus camaldulensis*

Denise K Daley, Ruby L Alexander-Lindo, Trevor Yee, Paul Reese

Herbal medicine is a major contributor to traditional therapy and has formed the basis for the development of many

current pharmaceuticals and to the field of complementary and alternative medicine. Diabetes mellitus is a global epidemic to over 170 million people worldwide. Thus, this study aims to investigate the effect of the folkloric use of *Eucalyptus camaldulensis* on the blood glucose concentration and to subsequently isolate, purify and elucidate the active compound(s) within the leaves and stem of the plant for product development.

An oral glucose tolerance test (OGTT) was done with the crude hexane, ethyl acetate and methanol extracts using an Accucheck Advantage (II) glucose kit in order to determine the effect on the blood glucose concentration. The crude hexane extract caused the most hypoglycaemic effect (4.71 ± 0.19 mmol/L vs 6.32 ± 0.369 mmol/L dimethyl sulfoxide, control, at the 90-minute interval) and as such further purification was carried out using chromatography. The fractions obtained were bioassayed using the OGTT which showed three groups (D1, D2 and D3) being the most hypoglycaemic ($p \leq 0.05$). Recrystallization of these groups yielded three compounds (labelled K1, K2 and K3). K1 (50 mg/kg body weight [BW]), K2 (30 mg/kg BW) and K3 (30 mg/kg BW) significantly reduced the glycaemic peak when compared with the control (5.26 ± 0.183 mmol/L, 5.44 ± 0.199 mmol/L and 5.05 ± 0.182 mmol/L vs 6.32 ± 0.369 mmol/L at the 90-minute interval, respectively). The structures of the hypoglycaemic compounds were then elucidated using various spectroscopic techniques and an OGTT comparison was done with the commercially available compounds and a positive control, metformin.

The hypoglycaemic compounds isolated from *E camaldulensis* were identified as fatty acids, with the most bioactive compound, K2, being a mixture of hexadecanoic and octadecanoic acids in a specific ratio. This purification and elucidation will undoubtedly lead to the scientific validation of the use of *Eucalyptus camaldulensis* as an antidiabetic plant and subsequent translational product development of new pharmaceuticals, nutraceuticals and functional foods. Therefore, this research will contribute to an overall reduction in the healthcare cost for many countries due to an improvement or prevention of these lifestyle chronic ailments by extension.

