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Profiling of the Glycemic Index of Underutilized Fruit and Vegetable

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Glycaemic Index (GI) is a term used to describe the effect on blood glucose of consuming a carbohydrate rich meal. It is accepted knowledge that the digestion and the absorption of carbohydrate leads to an increase in the levels of blood glucose. The extent and rate of elevation depend on a number of factors. For optimum health, it is essential that blood glucose is maintained between 3.0-5.5mmol per litre. This is achieved by the pancreatic hormones insulin and glucagon that work synergistically to control the levels of circulating glucose. When this system is compromised, for example when the pancreas or insulin receptors are damaged, blood glucose levels cannot be controlled. This leads to the development of type two Diabetes Mellitus (T2DM). As nutritionist, we are interested in consuming a diet that provides optimum health. With respect to carbohydrate and GI value, this means avoiding foods that result in a sudden peak in blood glucose (known as high GI foods). The GI value of a food ranges from 0 to 100, with the highest value being for pure glucose. Complex carbohydrates, especially from whole grains, have a lower GI value.

There is anecdotal (and scientific) evidence to suggest that fruits, vegetables and herbs (including under-utilised species) can be used to control T2DM. For example, bitter gourd (*Momordicacharantia*) contains charantin, momordicin, cucurbutanoids, which are responsible for the hypoglycaemic principle. Bitter gourd extracts was shown anti-hyperglycaemic effect in streptozotocin-induced diabetes rats (STZ) due to the inhibition of glucose-6-photphatase as well as stimulation the activity of hepatic glucose-6-phosphate dehydrogenase (Lawrence *et al.,* 2009). In addition, an aqueous extract of raw ginger (*Zingiberofficinale*) was resulted that there was a significantly effect in lowering serum glucose, hypolypidemic potential of STZ-induced diabetic rats compare to control group after 7 weeks (Amin *et al*., 2006). Moreover, the effect of fenugreek (*Trigonellafoenum-graecum*) ethanolic extract was examined after 2 weeks. The result was significant effect on weight loss in diabetes rats. From that, the serum glucose, cholesterol profile was reduced, whereas insulin level was inclined only in diabetes rats, $p<.05$ (Akram *et al.,* 2007).

The purpose of this research is to review existing evidence of the role of selected under-utilised species in controlling T2DM. Promising species will be selected for in-vitro studies to determine the effect on the GI value of a rice based diet, thus creating a GI profile for the under-utilised species. The species selected for study are bitter gourd, ginger, fenugreek, turmeric.

Initial studies will induce the development of an in-vivo method to stimulate digestion and absorption. Boiled white will serve as the control. The effect of adding the species under investigation at various concentrations will be studied.

Time and ethics permitting, the second phase of the study will include in-vivo measurement of blood glucose in a range of subjects following consumption of rice and mixed meals containing the species being investigated.

Key words: glycaemic index, carbohydrate, diabetes, glucose, insulin, nutrient, underutilised, bitter gourd, ginger, fenugreek, *Trigonellafoenum-graecum, Zingiberofficinale, Momordicacharantia*.