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In-vitro screening of medicinal plants for potential antidiabetic effects

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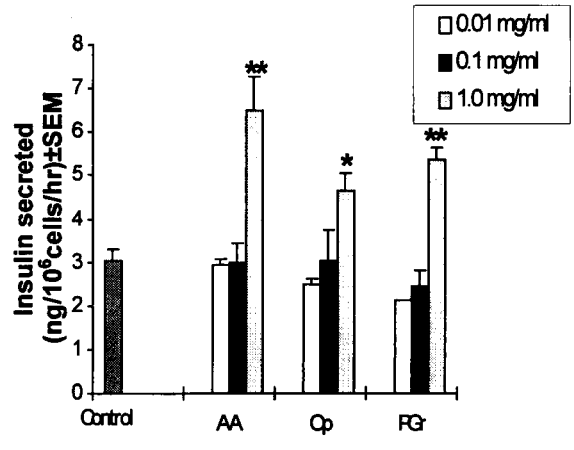
The present work was carried out to investigate potential anti-diabetic effects of 32 traditionally used medicinal plants. These were investigated for 1) inhibitory effect on glucose uptake into intestines and 2) stimulatory effect on insulin secretion. Both were examined using simple *in vitro* models thereby minimising the number of animals used.

The effect of aqueous extracts on glucose uptake was examined using brush border membrane vesicles (BBMV) prepared according to the method of Hopfer (1972). Glucose was transported into the vesicles via Na^+/glucose transporter "SGLT" (Hopfer, 1972). ^{3}H-Glucose was used in order to quantify the amount of glucose transported. The uptake was examined for 20 seconds which was the time showing maximum uptake. Preliminary screening revealed 4 inhibitory plant extracts (1.67 mg/ml) i.e. *Lycium chinensis* (Solanaceae), *Piper longum* (Piperaceae), *Pterocarpus marsupium* (Leguminosae) and *Salacia spp.* (Celastraceae). Semiquantification of the amount of glucose by TLC revealed negligible amount of glucose in the 4 extracts. This suggested that the inhibition observed was not due to the competition between glucose in the extracts and radiolabelled glucose but due to other active compounds present in the extracts. The strongest inhibition was observed in *Lycium chinensis* in which the percentage of inhibition (mean±SEM) was 58.47±0.53; that observed in *Piper longum*, *Pterocarpus marsupium* and *Salacia spp.* was 47.97±3.11, 38.29±2.88 and 34.13±0.95, respectively (n=12; 2 separate experiments).

The effect of aqueous extracts on insulin secretion was examined using a rat insulinoma cell line (RIN cells). RIN cells were selected due to the ability of the cells to respond to some known secretagogues such as forskolin, IBMX, ketoisocaproic acid and carbachol. In the preliminary screening, the extracts were tested at a concentration of 1 mg/ml. The cells were incubated with extracts at 37 °C for 1 hour and amount of insulin secreted was quantified using radioimmunoassay (Harris, 1996). Of 32 plants, 3 plants including *Anemarrhena asphodeloides.* (Liliaceae), *Opuntia spp.* (Cactaceae), and *Platycodon grandiflorum* (Campanulaceae) were found to have stimulatory effect on insulin secretion (Fig. 1). The viability of the cells after being exposed to the extracts was examined using Sulforhodamine B (SRB) assay (Skehan, 1990). *Platycodon grandiflorum* (PGr) was found to be toxic to the cells but not *Anemarrhena asphodeloides* (AA) and *Opuntia spp.* (Op).



*P<0.05, **P<0.01

Fig. 1 : Stimulatory effect of the 3 active plant extracts on insulin secretion in RIN cells

References

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