# GLUCOSE UPTAKE :Stimulatory Activity of *Gynura procumbens* in 3T3- F442A adipocytes

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## Abstract

*Gynura procumbens* (Compositae) has been used as folk remedy for the treatment to control diabetes mellitus and hyperlipidemia. The aim of this study was to examine whether *G. procumbens* extract for various solvent system had an enhancing effect on glucose uptake in 3T3 adipocyte cell lines. At the concentration 0.1mg/mL of hexane fraction showed increase in glucose uptake activity 4.5 fold whereas etyl acetate fraction increased 2.2 fold at 0.005 mg/mL of compare to untreated. For butanol fraction showed dependent manner of insulin and at 0.05mg/mL of extract, glucose uptake activity was increased 1.4 fold compare to the insulin.These results suggest that the antidiabetic action of *G. procumbens* may be mediated throught the stimulation of glucose uptake and the potentiation of insulin action.

Key words: Glucose uptake, Gynura procumbens, 3T3 adipocytes, antidiabetic

## Introduction

Traditional plant have been widely used and served as major sources of drugs in pharmaceutical industries. Each parts of medicinal plants have it owns used for treatment of certain disease. Numerous examples had impressively demonstrated the innovative potential of natural compounds and their impacts on the progress of drugs discovery and development. It is about 30% of worldwide sales of drugs are based on natural products (Grabley and Thiericke, 1999).

*Gynura procumbens* Merr is a herb belonging to the family Compositae .Locally known as 'Akar Sabiak', 'Kecam Akar'or 'Sambung Nyawa'. It has been used for treatment of eruptive fevers, rash and kidney disease. This plant have been used as folk medicine to control diabetes mellitus and hyperlipidemia. In Thailand *G. procumbens* has been used as topical anti-inflammatory, anti allergic agents and was reported to be effective against Hepes Simplex Virus (Jiratcharikul 2001).

The present study, is aimed to determine the effect of fractionation of *G. procumbens* in various solvent system in *in vitro* model of glucose uptake using 3T3 adipocyte cell lines.

## Materials and Methods

### Plant Material

*Gynura procumbens* was collected from the Nursery of Laboratory of Natural Product, Institute of Bioscience , UPM Serdang ,Selangor. The fresh leaves of *G. procumbens* were dried and weighed.

### Preparation of the extract

Plant material was dried and ground into small mesh size using a Wiley mill. The processed plant material was extracted by soaking in methanol for two days after which the first batch of crude methanolic extract was collected and evaporated in vacuo to dryness. The residual plant material was resoaked with fresh methanol and the extraction procedure repeated until four batches of crude extracts were obtain and pooled. The extract was further subjected to solvent-solvent partitioning starting from hexane as the least polar solvent, followed by solvents of increasing polarities, that is ethyl acetate (EtOAc) and butanol (BuOH). The crude fractions were then subjected for evaluation of glucose uptake assay described below.

### Cell culture

Mouse 3T3-F442A fibroblast, obtained from the European Collection of Cell Cultures, were maintained in DMEM supplemented with 10% Foetal Calf serum, and allow it to be confluent to become adipocytes.

### Glucose uptake activity assay

Cell grown in 96-well plates were preincubated with Krebs-Ringer buffer at 37˚C for 30 min and then treated with or without insulin or test samples at 37˚C for 10 min. The glucose uptake reaction was initiated by adding 2-deoxy [$^{3}$ H] glucose. After incubation at 37˚C for 30 min, cells were washed three times with ice-cold KRB and solubilized with SDS. The radioactivity incorporated into the cells was measured with a top count microplate scintillation counter.

## Results and Discussion

This study was performed to investigate the possible effects of the test extract fraction of *G. procumbens* on *in vitro* glucose uptake activity in 3T3- F442A adipocytes cell line. As shown in Figure 1, at the concentration of 0.1mg/mL of hexane fraction, the glucose uptake activity was increased 4.5 fold whereas etyl acetate fraction increased 2.2 fold at concentration 0.005mg/mL compare to untreated ( Figure 2). For butanol fraction showed at 0.05mg/mL of extract, glucose uptake activity was increased 1.4 fold compare to the insulin (Figure 3).

From the result it shows that hexane and etyl acetate crude fraction have potential in stimulating glucose uptake in 3T3-F44 adipocytes, whereas butanol crude fraction have the potential only by having the insulin ( dependent-manner).

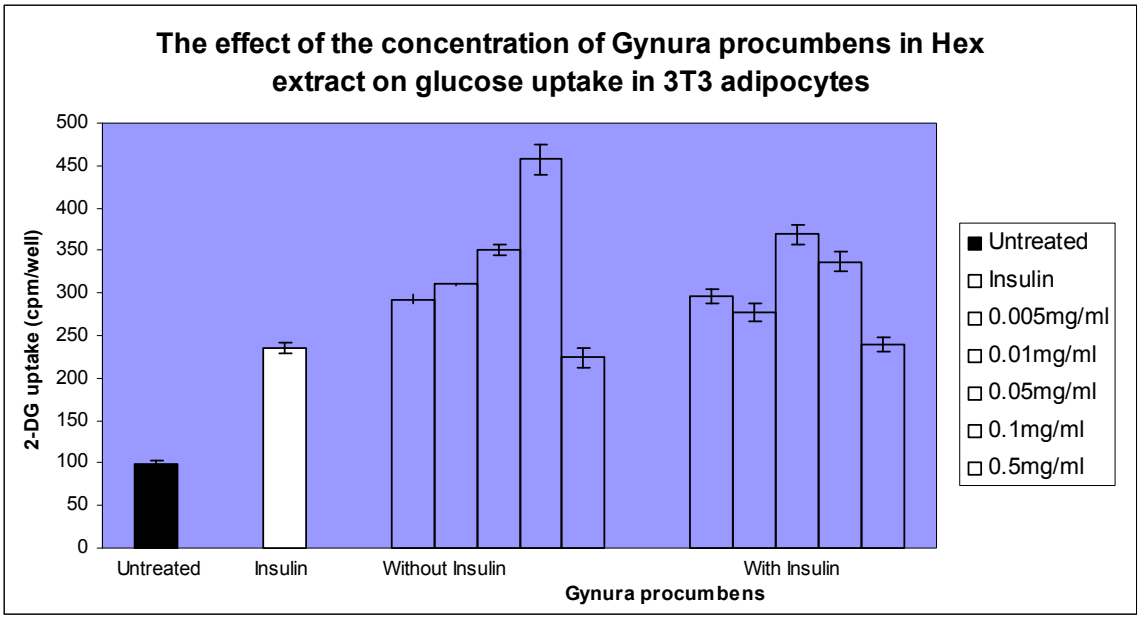


Figure 1: Effect of the various concentration of Gynura procumbens in hexane extract fraction on glucose uptake in 3T3 adipocytes.
Values are given as mean ± SEM (n = 4)

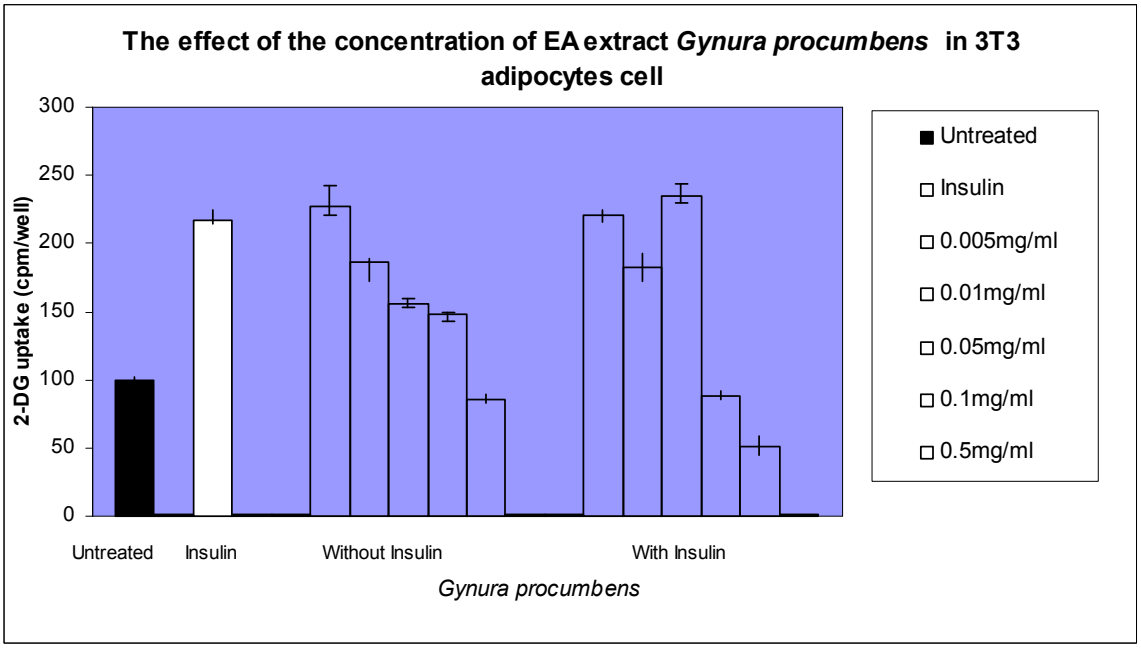


Figure 2: Effect of the various concentration of Gynura procumbens in etyl acetate extract fraction on glucose uptake in 3T3 adipocytes.
Values are given as mean ± SEM (n = 4)

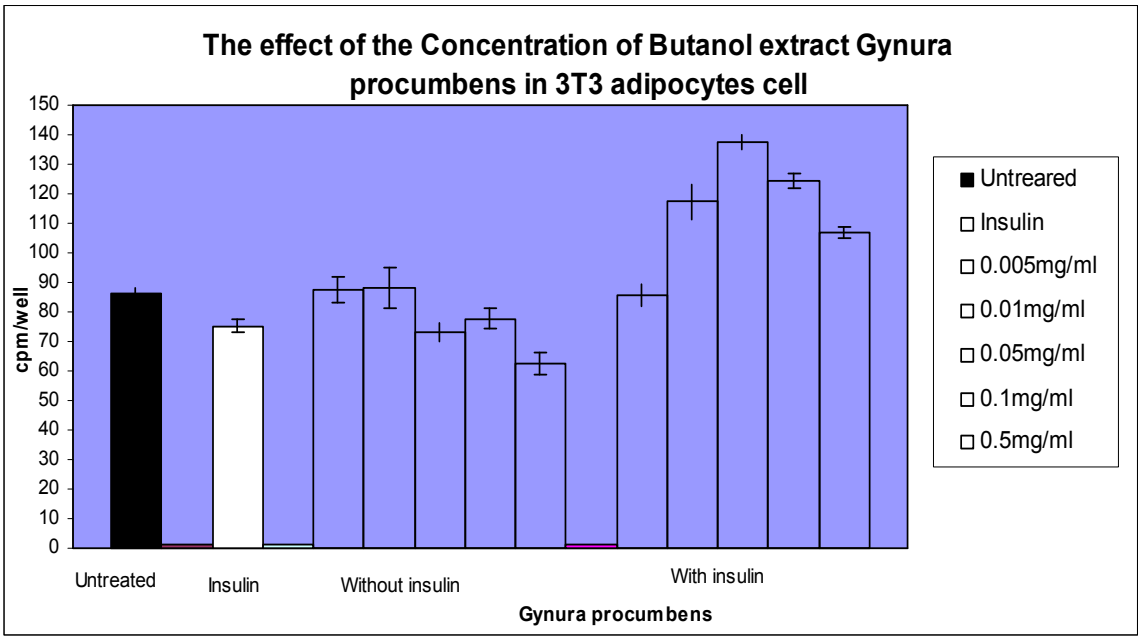


Figure 3: Effect of the various concentration of Gynura procumbens in butanol extract fraction on glucose uptake in 3T3 adipocytes.
Values are given as mean ± SEM (n = 4)

## Conclusion

We have demonstrated that crude fraction of *G. procumbens*, have potential in stimulating glucose uptake and insulin stimulating glucose uptake in 3T3-F44 adipocytes. The experiment will however need to be repeated further with lower concentration for etyl acetate. Further experiments are necessary to determine the cytotoxicity of fraction and to identify active compounds in glucose uptake assay.

## References

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