

SHORT COMMUNICATION

In Vitro Investigation of Antidiabetic Potential of Traditional Herb *Passiflora edulis* Sims

Varsha Rani R*, Shyam Madhavan K, K Mangathayaru

College of pharmacy, Sri Ramachandra Institute of Higher Education, Porur, Chennai-600116

*Correspondence: varshasplendid6@gmail.com

ABSTRACT

Background: Diabetes Mellitus, currently a Global epidemic affects the quality of the lives of millions. Beside prescribed medication, several herbal drugs are popularly taken as supplements and there is a lot of scientific attention on folklore herbs used in diabetes. The current study is focused at evaluating the antidiabetic potential of *Passiflora edulis*, through an in vitro investigation, a potential herb in the diabetic management. **Methods:** Hydro alcoholic extract of powdered leaves of *P. edulis* were subjected to phytochemical screening and assessed for glucose uptake in vitro in yeast cell model. **Results:** At a concentration of 5mg/ml, there has been 83.4% uptake of glucose by yeast cells mediated by the extract. There has been 46.5% glucose uptake by yeast cells at lowest tested concentration of 1mg/ml. Yeast cell represents an excellent in vitro system for assessing the trans membrane uptake of glucose, they also mimic glucose utilization by peripheral tissues in vivo. **Conclusion:** The results have demonstrated significant enhancement of glucose uptake by yeast cells brought about by the extract of leaves of *P. edulis*. The findings being significant, the leaves of *P. edulis* may be developed as a highly potent health supplement in diabetic management.

KEY WORDS: Antidiabetic Potential, cell Glucose uptake, hydro alcoholic, *in vitro* assay, *Passiflora edulis*.

1. INTRODUCTION

Diabetes Mellitus (DM) is a systemic metabolic disease characterized by hyperglycemia, abnormal elevated levels of lipid and fat in blood and hypoinsulinemia. According to WHO, the global prevalence of diabetes is estimated to increase from 4% in 1995 to 5.4% in 2025, majorly in developing countries. India presently has the largest number of diabetic patients in the world and has been in famously known as 'diabetic capital of the world'. Drug therapies are been used in the treatment of diabetics but lead to various side effect. Thus, active research has been performed on traditional available medicinal plants to treat the same. Hence, current study is focused to evaluating the antidiabetic potential of plant *Passiflora edulis*.

Genus *Passiflora* consists of 520 species of dicot plants. *P. edulis* commonly known as Passion fruit is a pernicious climbing vine indigenous to Brazil, Paraguay now cultivated commercially in tropical and sub-tropical regions around the world. Passion Fruit commercially cultivated is yellow sweet, sour seedy incidentally found to contain flavonoids as major primary constituent.

Traditionally the species of *Passiflora* have been extensively used in traditional medicines for the symptoms of anxiety, migraine, nervousness, Insomnia, mild diuretic, digestive stimulant, approved as OTC sedative until 1978 most activities associated with (CNS) activities, anxiolytic and antidepressant.

While fruit of PE is being widely investigated in relation to Diabetes mellitus we envisaged to explore the antidiabetic efficacy of the leaves of indigenously cultivated PE. Unlike fruits the leaves are preferred and more amiable to phytochemical processing and can be developed as an herbal supplement with long shelf life for a cure of Diabetes mellitus.

2. MATERIALS AND METHODS

2.1 Identification of the plant

The plant *P. edulis* was identified based on its characteristic features.

2.2 Extraction of plant material

Fresh leaves of *P. edulis* were collected from the fields located in Coimbatore. The collected plant leaves were shade dried for 2 weeks, coarsely powdered and subjected to hydro alcoholic extraction using solvents ethanol and distilled water (1:1). The maceration was performed by immersing 50g of leaf powder in 250 ml of each solvent for 24h, 48h, and 62h subsequently. The filtrate collected was evaporated to dryness to obtain a crude extract.

2.3 Evaluation of antidiabetic potential by glucose uptake by yeast cells

Yeast suspension was prepared by repeated washing (by centrifugation 3,000×g; 5 min) in distilled water until the supernatant fluids were clear. A 10% (v/v) suspension was prepared with the supernatant fluid. 1mL of glucose solution (25 mm) was added to various concentrations of hydro alcohol extract (ranging from 1mg to 5mg) and incubated for 10 min at 37 °C.

Reaction was started by adding 100 µl of yeast suspension, vortexes and further incubated at 37 °C for 60 min. After 60 min, the reaction mixture was centrifuged (2,500×g, 5 min). To 1ml of supernatant, added 2mL Dinitro

Salicylic Acid (DNSA) and kept in boiling water bath for 5 min. The glucose content was estimated in the supernatant using UV spectrophotometer at the wavelength 565 nm. Metformin was used as the standard drug. The experiment was performed in triplicate.

The antidiabetic potential of the plant *P. edulis* was evaluated in vitro using glucose uptake by yeast cells and the results were represented graphically.

3. RESULTS AND DISCUSSION

The results indicate that the hydroalcoholic extract of *P. edulis* at the highest concentration of 5mg/mL showed up to 83.36% increase in glucose uptake by yeast cells (in situ) and even at lowest concentration of 1mg/mL, it showed 45.69% uptake of glucose.

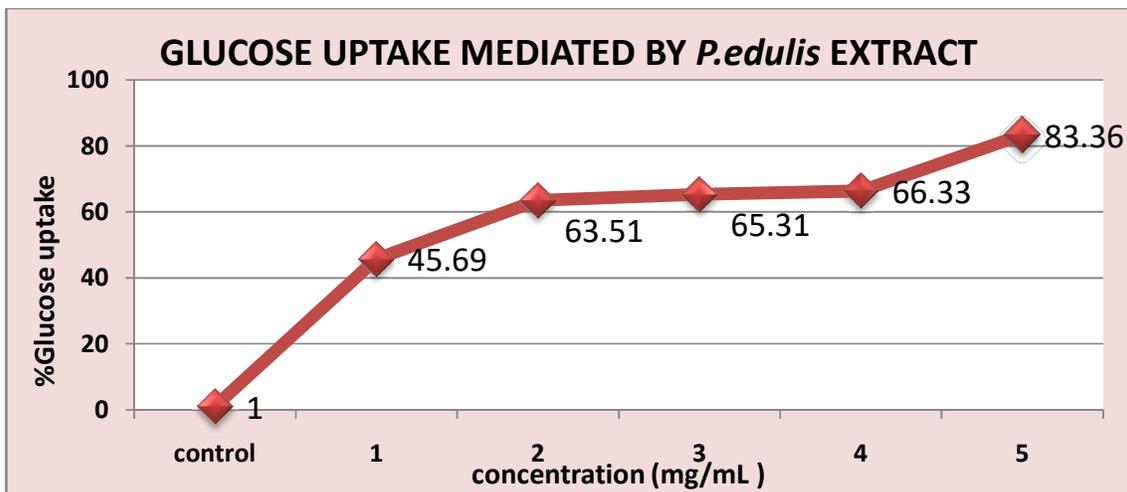
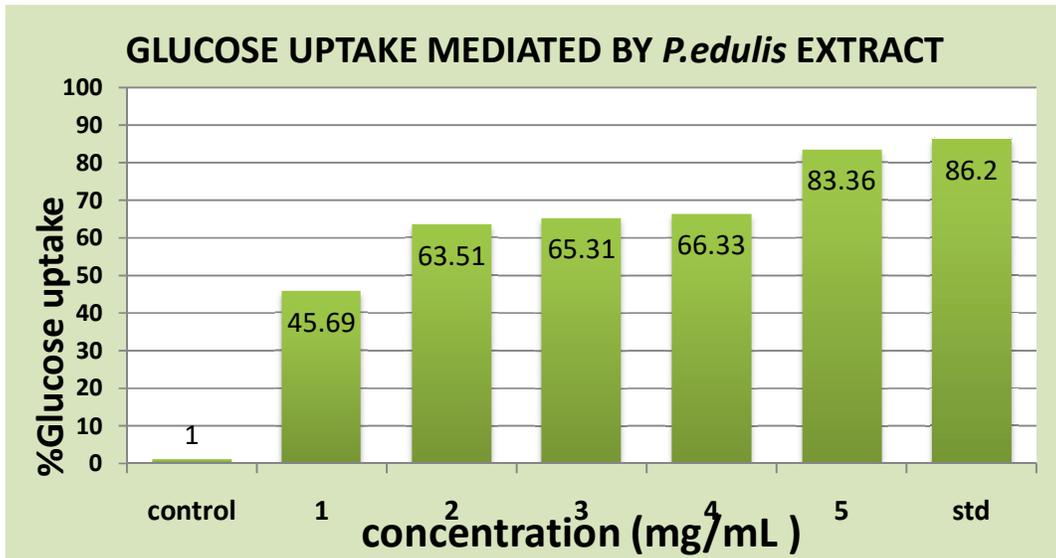
It is stated that transport of glucose across yeast cell membrane occurs by facilitated diffusion down the concentration gradient. Hence, the glucose transport occurs only if the intracellular glucose is effectively reduced (utilized). The data obtained clearly suggests that the plant extract is capable of effectively enhancing glucose uptake which in turn suggests that it is capable of enhancing effective glucose utilization thereby controlling blood glucose level.

The result is significant considering the fact that PE extract stimulates the glucose uptake at the tested dose, itself being a conglomerate of multiple phytochemicals. Multi-pharmacological action mechanism of herbal drugs being well reported, the study is to be supplemented with further investigations on other metabolite targets of diabetes. Thus, validating antidiabetic efficacy of the little studied leaves of PE will go a long way in the development as an herbal supplement in diabetes.

Figure 1. *Passiflora edulis* plant



AVERAGE TRIPPLICATE DETERMINATION



4. CONCLUSION

On the basis of results and findings, the PE showed highly potent antidiabetic activity which can be further envisaged and developed into an effective health supplement for diabetic management.

5. CONFLICT OF INTERESTS

The authors conclude no conflict of interest.

REFERENCES

1. Vijayalakshmi, Immanuel Selvaraj, Sindhu, Arumugam. *In Vitro* Investigation of Antidiabetic Potential of Selected Traditional Medicinal Plants. International Journal of Pharmacognosy and Phytochemical Research 2011;6(4):856-61.
2. Abirami N, Natarajan B, Sagadevan E. Phytochemical Investigation and *In vitro* evaluation of hypoglycemic potential of *Grewia hirsuta*. International Journal of Pharma and Biosciences 2014;5(1):76-83.
3. Phamiwon ZAS, Sheila John. Phytochemical analysis and thin layer chromatographic studies of *Passiflora edulis* leaf extracts. International Journal of Food Science and Nutrition 2017;2(2):38-41.
4. Somnath Devidas Bhinge, Mangesh Anil Bhutkar, Dheeraj Suhas Randive, Ganesh Hindurao Wadkar, Tejashri Suresh Hasabe. *In vitro* hypoglycemic effects of unripe and ripe fruits of *Musa sapientum*. Brazilian Journal of Pharmaceutical Sciences 2017;53(4):159.