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Research Article

Study of *Glycyrrhiza glabra* on glucose uptake mechanism in rats

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Abstract

Herbal medicines are recommended for diabetes management in many parts of the world. *Glycyrrhiza glabra* is also used in antidiabetic activity. In the present study *Glycyrrhiza glabra* was compared for their role in glucose transport mechanism. Peroxisome proliferation activated receptors (ppar's) are ligand dependent transcriptional factors regulating the expression of a group of genes that play an important role in glucose and lipid metabolism.*Glycyrrhiza glabra* have peroxisome proliferator activated receptor γ (ppar-γ) ligand binding activity, and that the active compounds in the non aqueous fractions are prenylflavanoids such as glycycoumarin, glycyrin, dehydroglyasperin C, dehydroglyasperin D. Rat everted intestinal sac model was used for study. *Glycyrrhiza glabra* at different concentration (25mg-100mg/ml) and standard (Metformin 10mg/ml) preparation were added to mucosal solution. Glucose concentrations were determined before and after incubation. Result showed that mucosal disappearance, serosal appearance and gut wall content in *Glycyrrhiza glabra* 79.04%, 59.87%, 19.17% while in Metformin it was 68.55 %, 52.50%, 16.05% respectively. Thus *Glycyrrhiza glabra* is found to posses' potent therapeutic effect in glucose uptake.

Keywords: *Glycyrrhiza glabra*, Diabetes, Glucose, Receptors.

Introduction

A liquorice extract from *Glycyrrhiza glabra* has been found to be effective in preventing diabetes. *Glycyrrhiza glabra* enhance insulin mediated glucose disposal in muscles also enhance GLUT-1 transport from intracellular site to plasma membrane. In this study, we demonstrated the effects *G. glabra* on glucose uptake on rat everted intestine.

Material and Methods

Preparation of liquorice extract:

The roots of liquorice, *Glycyrrhiza glabra Linne*, were extracted with 5 volumes of 95% ethanol twice, and liquorice ethanolic extract was obtained by filtration and concentration.

Animal experiment:

Male Swiss albino rats weighing 150–200g (10–12 weeks) maintained on commercial feed and tap water were used throughout the study. They were maintained in standard environmental conditions with 12 h light and 12 h dark exposure. Prior to experiments animals had free access to water and food. Investigations using experimental animals were conducted in accordance with internationally accepted principles for laboratory animal use and care.

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Preparation of everted intestinal sac:

After overnight fasting, rats were killed by a cervical dislocation. The abdomen was opened by a midline incision. The whole of the small intestine was removed by cutting across the upper end of the duodenum and the lower end of the ileum and manually stripping the mesentery. The small intestine was washed out carefully with cold normal oxygenated saline solution (0.9%, w/v, NaCl) using a syringe equipped with blunt end. The midportion of the small intestine from each animal was used in order to minimize the transport variability of the segments. Intestinal segments (5±2 cm) were then everted. The empty sac was filled with 0.5ml of De-jalon's salt solution. The filled intestinal sac was then slipped off the needle carefully and the loose ligature on the proximal end was tightened. After weighing, the distended sac was placed inside an organ bath containing 50 ml of the same incubation medium (mucosal solution). The organ bath was surrounded by a water jacket maintained at 37–40 ◦C and placed in metabolic shaker at a frequency of 50–110 shake/min. The external incubation medium was continuously bubbled with a gas mixture of 95% oxygen and 5% carbon dioxide during the whole incubation period.

Intestinal transport studies:

At the end of the incubation period (30 min) the sac was removed from the organ bath, blotted by a standardized procedure. The serosal fluid was drained through a small incision into a test tube. So as to empty the sac completely, gentle pressure was applied, after which the serosal and mucosal fluids were measured using Erba autoanalyser.

Control experiments:

In each series of experiments, a parallel control strip was included from the same rat under same incubation conditions as with the plant extract. Control guts were incubated in same medium without the plant extract. For experiments performed where everted intestinal sacs were incubated with corresponding volume of water was added to minimize any variation.

Results and discussion

The effects of *Glycyrrhiza glabra* extract on d-glucose and fluid absorption (mucosal disappearance) and transport (serosal appearance) across everted intestinal sacs of rat are summarized in Table 1. In order to find the lowest inhibitory concentration and any dose dependent relationship of graded concentrations of *Glycyrrhiza glabra* (from 25-100 mg/ml) were incubated with the intestinal segments in the mucosal solution.

Discussion:

Glycyrrhiza glabra affect peroxisome proliferation activated receptors, thereby regulating the expression of a group of genes that play an important role in glucose metabolism. We demonstrated the effects of licorice hydrophobic flavonoids from *G. glabra* on blood glucose level on rat everted intestine.

References

1) Sanjai Saxena,(2004). Glycyrrhiza glabra: medicine over the millenium, *Natural Product Radiance*, 362
2) Kaku Nakagawa, Hideyuki Kishida, Naoki Arai, Tozo Nishiyama, and Tatsumasa Mae, (2004). Licorice flavonoids suppress abdominal fat accumulation and increase in blood glucose level in obese diabetic kk-ay mice, Pharmaceutical Society of Japan, 1775-1776
3) M.F. Mahomoodally, A. Gurib-Fakim, A.H. Subratty, (2006). Effect of exogenous atp on momordica charantia linn. (cucurbitaceae) induced inhibition of d-glucose, l-tyrosine and fluid transport across rat everted intestinal sacs in vitro, *Journal of Ethnopharmacology* **110**,257-260

Table1: Effect of *Glycyrrhiza glabra* in d-glucose transport across the intestinal sac

Concentration of *Glycyrrhiza glabra* in medium (mg/ml)	d- glucose transport (mg/dl)		
	Mucosal disappearance	Serosal appearance	Gut wall content
25	79.04±1.22[-4.82]	59.87±1.39[-23.99]	19.17±1.16[+64.69]
50	80.08±1.10[-3.78]	68.42±1.27[-15.44]	11.66±1.09[+72.20]
100	92.48±1.00[-8.62]	82.78±1.14[-1.08]	9.70±0.98[+74.16]

Table2: Effect of Metformin in d-glucose transport across the intestinal sac

Concentration of Metformin in medium (mg/ml)	d- glucose transport (mg/dl)		
	Mucosal disappearance	Serosal appearance	Gut wall content
10	68.55±1.26[-1.34]	52.50±1.18[-14.71]	16.05±0.98[+51.16]
10	67.00±1.17[-0.21]	50.42±1.09[-16.79]	16.58±0.92[+52.63]
10	66.08±1.06[-1.13]	52.04±0.99[-15.17]	14.04±0.90[+53.17]