# EFFECTS OF SELECTED HERBAL EXTRACTS ON BLOOD CHEMISTRY PROFILES IN RATS

Salika Aritajat, Kanokporn Saenphet, Vorawut Thaworn and Suluck Wutteeraphol

Department of Biology, Faculty of Science, Chiang Mai University, Chiang Mai, Thailand

**Abstract.** Oral administration of 2 herbal extracts, *Coscinium fenestratum* (30, 60 and 90 mg/ml) and *Gynura divaricata* DC (15 and 30 mg/ml), was conducted in male rats for 30 days, and blood chemistry profiles then determined. The blood glucose levels of rats receiving *C. fenestratum* extract at concentrations of 30 and 60 mg/ml were significantly lower than those of controls ($p<0.05$) while the blood cholesterol levels were lower in 30 mg/ml group. The tendency toward decreased blood triglyceride levels was observed in all groups of rats given *C. fenestratum. G. divaricata* extract did not affect blood glucose levels at any concentration, but cholesterol levels were significantly higher than that of controls ($p<0.05$). The tendency toward decreased blood triglyceride levels was obviously observed in rats administered *G. divaricata* extract at a concentration of 30 mg/ml.

## INTRODUCTION

*Coscinium fenestratum*, known locally as *Tua-Wal-Hum* or *Hoa-Hum* is a native medicinal plant of Lao PDR. It is a climbing plant with a hard stem, yellow root and climbing branches. It has alternating leaves green on the dorsal side and white on the ventral side. There are white flowers in clumps. It is a natural climbing plant found in rain forests of every provinces of Lao PDR and in the adjacent parts of Thailand, such as the forest of Nong Khai Province. The preliminary identification revealed its external features were similar to *Arcangelisa flava* (L) Merr. (Dechwisissakuld *et al*, 2000). *Fibraurea recisa* Pierre is a medicinal plant similar to *C. fenestratum* found in Vietnam. The climbing branch used for medicinal purposes contains several kinds of alkaloids, *ie* beberine, palmatine and jatrorrhizine (Liu *et al*, 1982). An isoguindine alkaloid, an active substance found in *C. fenestratum*, is beberine of which 50% ethanolic extract affects central nervous system. The mature climbing branch is the part of *C. fenestratum* that is used. The dried branch may be kept for no longer than 6 months or it may be ground into a yellow powder. This plant is widely used in Thailand since it is believed to offer many important health benefits, such as reducing blood pressure, detoxification, and reducing blood glucose and cholesterol. The use of *C. fenestratum* extract in dogs, guinea pigs and rats decreases blood pressure (Singh *et al*, 1990).

*Gynura divaricata*, so called *Jakr-Na-Rai* or *Jin-Chee-Muo-Yea* is a shrub with a green stem and a fragile branch. In winter it becomes fully grown and sprouts yellow flowers (Harborne *et al*, 1999). There are 2 types of this plant, the round leaf type is called *Pae-Tum-Poung*. It has soft light green leaves covered with velvet-like hairs on both the dorsal and ventral surfaces. Branches are reddish green. Another type of *G. divaricata* used in this study is *Jin-Chee-Muo-Yea*. It has long leaves with a smooth surface and few hairs. It originated in China and is popularly used in Thailand. Leaves and fresh stems are used for treating diabetes, high blood pressure, heart disease, allergies, asthma, cancer, obesity, atherosclerosis, stomach disorders and kidney stones (Promrungraeng, 2007). This present study was designed to evaluate the blood biochemical parameters of rats receiving an aqueous extract of *C. fenestratum* (imported from Lao PDR) and *G. divaricata* (*Jin-Chee-Muo-Yea* type) using scientific methods to

Correspondence: S Aritajat, Biology Department, Faculty of Science, Chiang Mai University, Chiang Mai 50200, Thailand.
E-mail: salkaats@chiangmai.ac.th

evaluate their proving effects on decreasing blood glucose and cholesterol levels.

## MATERIALS AND METHODS

### Plant extraction

The climbing branches of *C. fenestratum* (imported from Lao PDR) were sliced and dried. Six grams of dried branch were placed in 100 ml distilled water and incubated at 60°C for 2 hours. A 60 mg/ml concentration of *C. fenestratum* extract was then obtained. Extracts at concentrations of 30 and 90 mg/ml were also prepared by the same method.

Fresh leaves of *G. divaricata* were crushed and 1.5 g of this was added into 100 ml distilled water, stirred and rinsed to obtain a 15 mg/ml *G. divaricata* extract.

### Experimental design

Male Wistar rats (*Rattus norvegicus*), weighing approximately 240-250 g were purchased from the National Laboratory Animal Center, Thailand. They were allowed to acclimatize to the departmental animal facility for one week prior to the day of the experiment. They had access to water and a standard diet (C.P. 082). The study room was maintained at approximately 25 ± 2°C in a 12 hour light/dark cycle. The Animal Use and Care Regulations of the Department of Biology, Faculty of Sciences, Chiang Mai University, were followed (Re 003/07).

Rats were randomized into 6 groups ($n$=5) and treated orally for 30 days (1 ml/day) with: (1) distilled water (control), (2-4) *C. fenestratum* extract at the concentrations of 30, 60 and 90 mg/ml, respectively, and (5-6) *G. divaricata* extract at the concentrations of 15 and 30 mg/ml, respectively. At the end of the treatment period, blood samples were collected by cardiac puncture technique and blood glucose, cholesterol and triglyceride levels were then evaluated by automate (Synchron C5X, Beckman) with the cooperation of the Clinical Chemistry Department, Faculty of Associated Medical Science, Chiang Mai University.

### Statistical analysis

Data were expressed as mean ± standard deviation. The significance of the difference between the means was determined by one-way analysis of variance (ANOVA). The observed significance was then confirmed using the least significant difference (LSD) test.

## RESULTS

Aqueous extracts of *C. fenestratum* can effectively decrease blood glucose levels. The blood glucose in rats treated with extracts at all concentrations, and especially the 30 and 60 mg/ml groups, were significantly lower than those of controls ($p<0.05$). The blood cholesterol levels in all treated groups was also lower, but were remarkably lower in the 30 mg/ml group. The triglyceride levels had a trend toward decreasing, but the difference was not statistically different from controls (Fig 1).

Neither blood glucose levels nor blood triglyceride levels in the rats treated with *G. divaricata* extract were different from those of controls. Their blood cholesterol levels, however, were significantly higher than those of controls ($p< 0.05$). Only rats treated with 30 mg/ml of this extract had lower blood triglyceride levels than controls (Table 1 and Fig 1).

## DISCUSSION

*C. fenestratum* is capable of decreasing blood glucose levels in laboratory rats. The blood glucose levels were significantly lower than that of the control group ($p<0.05$) when used at a concentration of 30 mg/ml/day. Similarly, blood cholesterol and triglyceride levels tended to be lower than controls. These results support the use of *C. fenestratum* to decrease blood glucose and lipid levels as is

Table 1
Blood chemistry profiles of rats treated with aqueous extract of *C. fenestratum* (CF) at concentrations of 30, 60 and 90 mg/ml and with *G. divaricata* (GD) extract at concentrations of 15 and 30 mg/ml for 30 days compared with controls.

| Groups | Number of rats | Blood chemistry profiles ( mg/dl) | | |
|---|---|---|---|---|
| | | Glucose | Cholesterol | Triglyceride |
| Control | 5 | 128.20 ± 7.60 | 48.00 ± 4.30 | 168.60 ± 30.60 |
| CF 30 mg/ml | 5 | 99.83 ± 10.03[a] | 40.17 ± 5.60 | 133.33 ± 45.69 |
| CF 60 mg/ml | 5 | 113.00 ± 7.38[a] | 46.50 ± 2.88 | 123.00 ± 4.03 |
| CF 90 mg/ml | 5 | 122.57 ± 5.77[a] | 45.85 ± 3.44 | 138.57 ± 11.16 |
| GD 15 mg/ml | 5 | 125.99 ± 53.95 | 76.00 ± 6.89[a] | 164.00 ± 57.69 |
| GD30 mg/ml | 5 | 120.30 ± 40.70 | 67.00 ± 10.98[a] | 111.00 ± 35.31 |

[a]Mean values were significantly different from the control group ($p<0.05$).

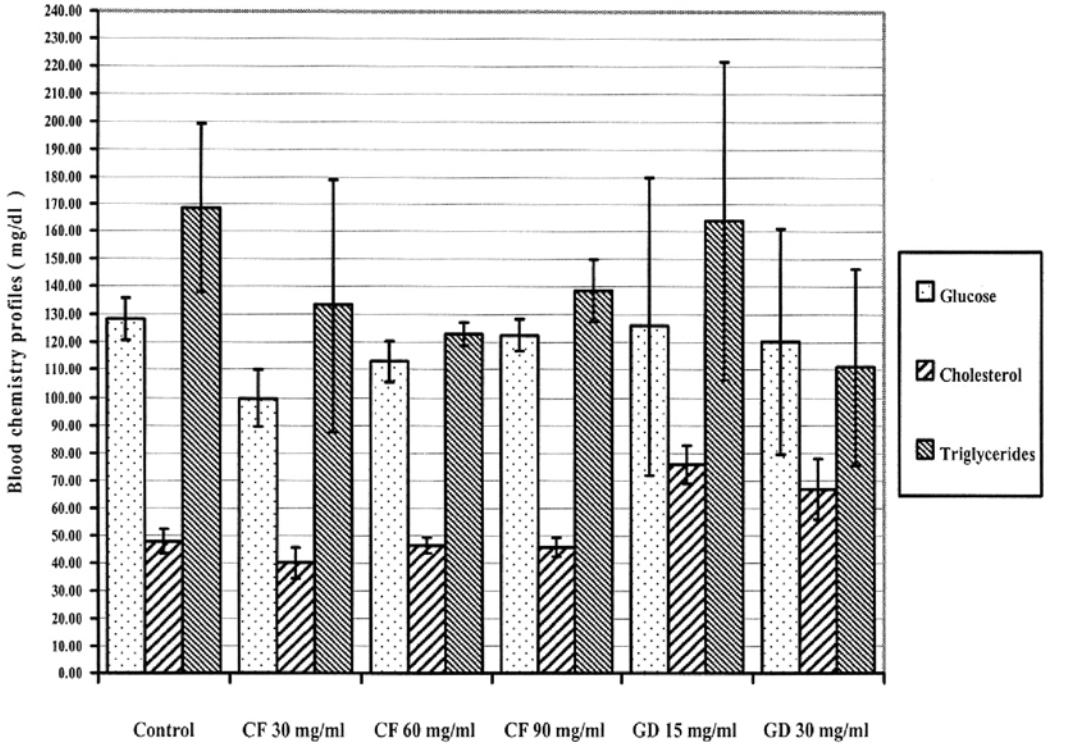


Fig 1- Blood chemistry profiles of rats treated with aqueous extract of *C. fenestratum* (CF) at concentrations of 30, 60 and 90 mg/ml and with *G. divaricata* (GD) extract at concentrations of 15 and 30 mg/ml for 30 days compared with controls.

carried out by local people and Thai traditional physicians. These findings also agree with a report by Shirwaikar *et al* (2005) who found the alcoholic extract of *C. fenestratum* could decrease blood glucose and cholesterol levels in diabetic rats. Our results did not support the use of *G. divaricata* to decrease blood glucose and lipid levels. This may be due to the low concentrations of the extract used in this study. The concentrations used were based on the number of fresh leaves traditionally recommended for general use in humans (5-6 leaves/day), but this may be too low a dose to exhibit lipid and glucose lowering properties. Moreover, small changes in blood glucose may not be noticeable in normal rats at homeostasis. The full efficacy of *G. divaricata* may only be found at higher concentrations in diabetic rats not in homeostasis. The ability of *G. divaricata* to decrease blood cholesterol and triglyceride levels, but not blood glucose levels is similar to that reported for *Helicteres isora*, a medicinal plant used in treating diabetes in India which was not able to decrease blood glucose or triglyceride levels in normal rats (Chakrabarti *et al*, 2002). The extract of *C. fenestratum* at all concentrations studied effectively decreases blood glucose and triglyceride levels in normal rats, while *G. divaricata* extract only reduced blood triglyceride levels, but not glucose levels. The blood cholesterol levels increased. With respect to the hypoglycemic properties of these 2 extracts in rats, further investigation in diabetic rats is warranted.

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