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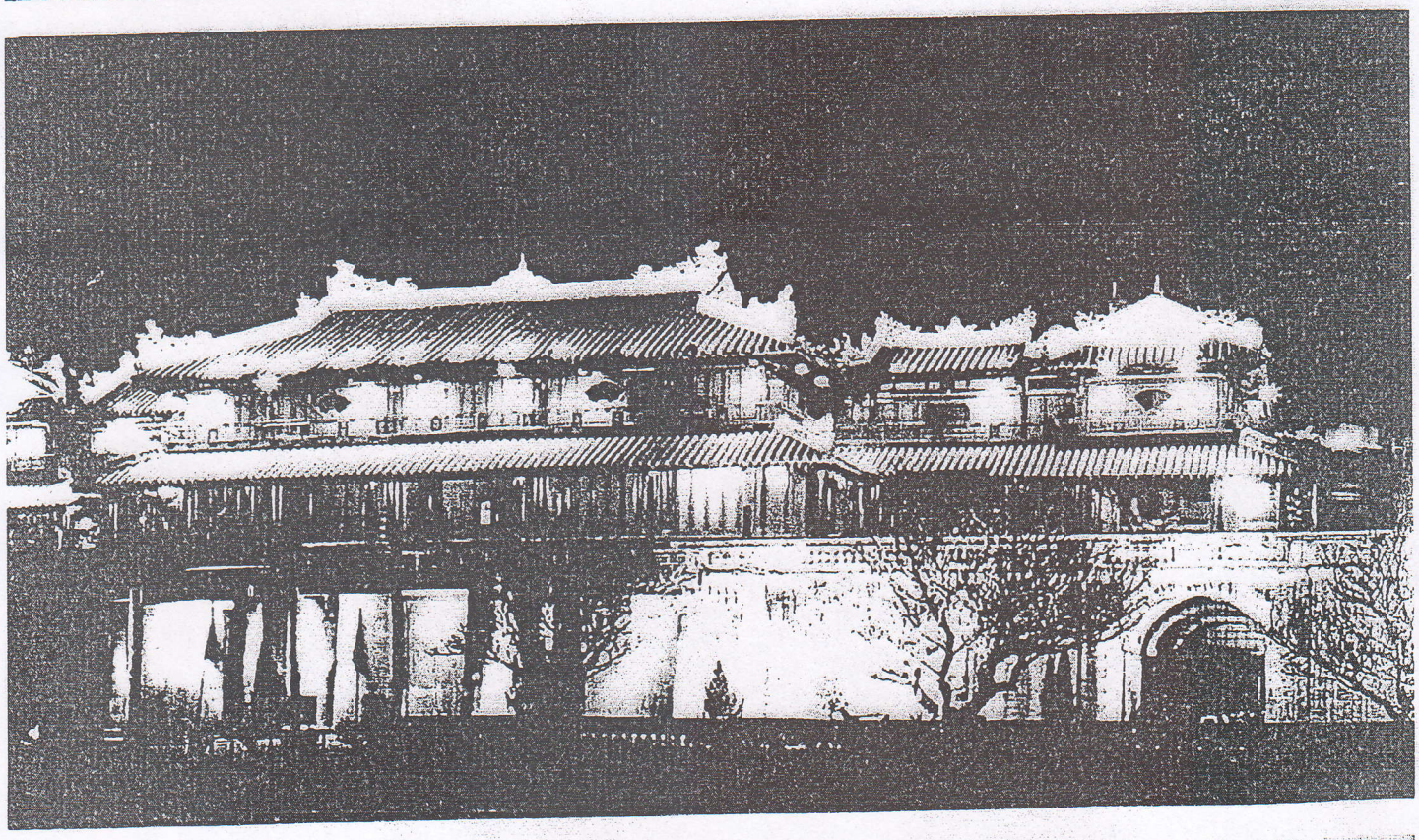
PHARMA INDOCHINA VI

THE DEVELOPMENT OF INDOCHINA PHARMACY IN THE CONTEXT OF GLOBAL ECONOMIC RECESSION



ANTIHYPERGLYCEMIC EFFECT OF *MUSA SEMINIFERA* LOUR. RHIZOME IN MICE

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1. BACKGROUND

Diabetes is a chronic disease and has become more common. Along with cancer and cardiovascular diseases, it is one of the causes that increases the rate of death in developed country. It is a metabolic disorder syndrome, result in chronic hyperglycemia due to lacking or resistance of insulin. It can lead to many dangerous complications such as cardiovascular diseases, stroke, blind, kidney failure, impotence, gangrene... Consequently, diabetes is concerned not only in public health organization but also in economic and society. The treatment of diabetes is long and costly. Almost drugs are used to treating diabetes cause many side effects and approximately 40% of patients who used anti-diabetic drugs failed in controlling the blood glucose level [1,4,7]. Therefore, the research on finding more effective, safer and cheaper medicines from plants is concern for many scientists all over the world.

Several species of *Musa* L. such as *M. paradisiaca* have been used to treat diabetes for a long time in India, China [8]. In Vietnam, *Musa seminifera* Lour. rhizome is a folk herbal medicine used widely for treatment diabetics in several ethnic communities [5].

Therefore, this report aims at evaluating hypoglycemic activity of *M. seminifera* on normoglycemic mice and streptozocine induced hyperglycemic mice.

2. MATERIALS AND METHOD

2.1. Materials

- The rhizome of *M. seminifera* Lour. is collected from Huong Tra district – in Thua Thien Hue province. Materials are washed cleanly, cut into thin slice, dried at 50^0C - 60^0C and crushed into raw powder.
- Male albino Swiss mice of body weight about 22 – 25 g that are provided by National Institute of Hygiene and Epidemiology.
- Streptozocine (STZ) (MP Biochemicals).
- Glucometer Accu – chek active and kits (Roche).
- Gliclazide (Diamicron – Servier – France).

2.2. Method

- Extraction and preparing suspension: Each of same amount of rhizomes of *Musa seminifera* powder was extracted with ethanol, chloroform or water (three times). The combined solutions were evaporated under vacuum to make ethanol, chloroform or water extracts. The sediments are made into suspensions by ultrasonic method.
- Blood glucose assay: Glucose oxidase method with kits and glucometer – using total vein tail blood [2,6]. Blood glucose is assayed on overnight – fasted mice.
- Study on the extract's effects on normoglycemic mice: Mice were taken with the extract at the dose equivalent to 16 g dried herb per kg body weigh for 7 days.
- Study of the extract's effects on STZ injected mice: 72h after STZ injection, fasting blood glucose was assayed and those mice with blood glucose exceeding 12mmol/L were chosen for the experiment. Such mice were divided five groups: control group taking distilled water, three testing groups which were taken with the extract fractions at the dose equivalent to 16 g dried herb per kg body weigh for 7 days. The remaining group was fed with gliclazide (control drug) at the dose 40mg/kg body weight per day. On the 7^{th} day, 12h fasted mice blood glucose was assayed.

- Statistical analysis: All the data were statistically evaluated using student's test with the support of EXCEL 2003. All the results were expressed as the mean ± SD from ten mice in each group. P value of 0.05 or less than considered to be significant.

3. RESULTS

3.1. Effect of the extract fractions of *M. seminifera* rhizome on blood glucose of normoglycemic mice.

7 days after treatment with the extract fractions on normoglycemic mice, the changes in blood glucose are shown in table 1.

Table 1. Changes in blood glucose of normoglycemic mice after 7 days treatment with the extract fractions.

Lots	Blood glucose levels (mmol/L)		Blood glucose change rate (%)	P (compare with control lot)
	1st day	7 th day		
Control	5.81 ± 0.69	7.01 ± 0.97	+ 20.65 ± 5.63	
Ethanol fraction	5.20 ± 0.52	6.48 ± 0.50	+ 24.61 ± 7.12	>0.05
Chloroform fraction	4.77 ± 0.23	6.20 ± 0.46	+ 29.98 ± 7.97	>0.05
Water fraction	5.91 ± 0.49	5.00 ± 0.71	- 15.40 ± 6.59	<0.01

+: increase

-: decrease

Results in the table 1 showed that, on normal mice with the dose equivalent to 16 g dried herb per kg body weigh per day, ethanol fraction and chloroform fraction increased blood glucose (+ 24.61% and +29.98%). There was not a significant difference in blood glucose at the same time among control (+20.65%) and those fractions treatment lots ($p > 0.05$). On the contrary, there was a significant decrease of blood glucose in mice taken the water fraction (-15.40%) ($p < 0.01$) compared with control lot (+20.65%).

3.2. Effect of the extract fractions of *M. seminifera* rhizome on blood glucose of STZ injected mice

Mice were injected intraperitoneally STZ at 150mg/kg body weigh. This is the common dose of STZ used in studying the antidiabetic substances on mice in Vietnam. 72h after STZ injection, those mice with fasted blood glucose level exceeding 12mmol/L were chosen for the experiment.

Table 2. Changes in blood glucose of STZ induced hyperglycemic mice after 7 days treatment with extract fractions

Lots	Blood glucose levels (mmol/L)		Blood glucose decrease rate (%)	P (compared with control lot)
	1st day	7th day		
Control	24.95 ± 2.17	20.18 ± 1.54	19.08 ± 5.36	
Ethanol fraction	25.22 ± 2.17	7.87 ± 0.70	68.79 ± 8.52	<0.01
Chloroform fraction	26.25 ± 1.44	13.7 ± 1.31	47.80 ± 7.01	<0.01
Water fraction	26.13 ± 1.87	11.04 ± 0.81	57.71 ± 8.23	<0.01
Gliclazide	26.22 ± 1.23	5.68 ± 0.72	78.29 ± 5.64	<0.01

Results in the table 2 showed that, on STZ induced hyperglycemic mice with the dose equivalent to 16 g dried herb per kg body weigh per day, all fraction decreased blood

glucose (47.80 to 68.79%). There was a significant difference in blood glucose at the same time among control (19.08%) and tested lots ($p < 0.01$).

3.3. The signs of mice pre and post – experiment

On experimentally hyperglycemic mice, they have the specific clinical symptoms of diabetic mice such as weight loss, polyuria and polydipsia. These symptoms have the improvement after 7 days experimented in the sample lots with the extracts from *M.seminifera* rhizome and gliclazide. On other hand, the control lot did not show this improvement.

4. CONCLUSION

Musa saminifera Lour. rhizome is known as a herbal medicine for treatment diabetes according to traditional experience. However, this is the first study on hypoglycemic activity of extract fractions from the rhizome of *Musa saminifera* in Vietnam.

Results in table 1 showed that, on normal mice with the dose equivalent to 16 g dried herb per kg body weigh per day, water fraction of *Musa saminifera* Lour. decreased blood glucose compared with control lot. There was a significant difference with $p < 0.01$. However, ethanol and chloroform fractions did not show this effect. It means that ethanol and chloroform fraction of *M. saminifera* did not have effects on blood glucose of normal mice.

Results in table 2 showed that after 7 days of the experiment, on STZ induced hyperglycemic mice with the dose equivalent to 16 g dried herb per kg body weigh per day, all fractions decreased blood glucose. There was a significant difference in blood glucose at the same time among control and tested lots ($p < 0.01$). Therefore, the ethanol fraction showed strong antidiabetes activity.

In addition the specific clinical symptoms of diabetic mice such as weight loss, polyuria and polydipsia were improved after 7 days experimented. Therefore, the extract fractions of *M saminifera* rhizome could inhibit hyperglycemia induced by streptozocine.

In conclusion, our results were the first scientific proof of hypoglycemic activity of *M saminifera* rhizome. The results were a basic research for further studies on bioactive components from this plant in diabetic treatment.

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