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Antihypertensive Activity of Korean Medicinal Plants Against Okamoto-SHR (I)

Il-Moo Chang*, Young-Choon Park Jae-Hoon Kim and Koo-Dong Han
Natural Products Research Institute
and
Jong-Heun Lee and Joong-Soo Kim
College of Dentistry, Seoul National University

오카모토 고혈압쥐에 대한 한국산생약의 항고혈압작용 (I)

장일무* · 박영춘 · 김제훈 · 한구동
서울대학교 생약연구소
이 종 흔 · 김 중 수
서울대학교 치과대학

Six medicinal plants described in Dong-Ee-Bo-Gam as to be useful for hypertension treatment were evaluated their antihypertensive activity against Okamoto-SHR, an animal model of spontaneous hypertension. Ethanol extracts of plant samples were prepared and were p.o. administered once daily for 20 days. Average blood pressures of rats were measured during two weeks periods before drug administration. Then blood pressure of each rat was measured every three days during drug administration period. As a positive control, propranolol, β-blocker was used and the blood pressures of test group rats were compared with those of negative and positive control group rats. Among 6 plant extracts, *Acanthopanax sessiliflorum* and *Atractylodes japonica*(*alba*) extracts appeared to exhibit antihypertensive activity.

Introduction

Six Korean medicinal plants, *Acanthopanax sessiliflorum*(Araliaceae), *Atractylodes japonica* (Compositae), *Xanthium strumarium*(Compositae), *Gastrodia elata*(Orchidaceae) and *Phellodendron amurense* (Rutaceae) have been frequently prescribed for the treatment of hypertension by oriental medical doctors since the Dong-Ee-Bo-Gam published which is one of the most popular oriental medicinal books among many oriental doctors.[1,2] However, no significant scientific investigations and evidences have been roported with respect to their pharmacological activity. In the course of our efforts for searching antihypertensive substances originated from natural products, the above six medicinal plants were selected to evaluate their potential antihypertensive activity against Okamoto-SHR, an animal model rat of spontaneous hypertension.

*All corresponds should be addressed to Dr. I. M. Chang.

Material and Method

Plants and plant extracts: All plants samples were purchased from local herb stores and were identified taxonomically by the botanist, Dr. H. J. Chi in our institute. Ethanol extracts of the plants samples were prepared as the followings; Dried plant sample, 1kg, of each was crushed and cold-extracted with 70% ethanol in continuous shaking. After the filtration, the fitrate was each evaporated in rotary evaporator at 45°C under reduced pressure. The dried residues obtained were dissolved in distilled water with aid of few drops of Tween 80.

Measurements of blood pressure: Dose of plant extract, 600mg/kg/rat/day, was p.o. administered once daily for 20 days. Systolic blood pressure was measured from rat tail by using specially devised physiograph. Details were reported elsewhere.[3] Each group consists of 6 Okamoto-SHR, and negative and positive control groups were provided. Positive control group received propranolol, β-blocker, dose of 75mg/kg/rat/day. And negative control group rats received distilled water alone. Prior to administrating plant extracts, the blood pressures of rats were measured for four times during two weeks periods and all rats were divided into the controls and test groups according to their average blood prossures. While plant extracts were being administered, the blood pressures of each group were measured once for every three days.

Results and Discussion

The results were summarized in Table 1. Among six plants extracts, the extracts of *Acanthopanax sessiliflorum* and *Atractylodes japonica* showed antihypertensive activity, whereas the extracts of *Gastrodia elata* and *Phellodendron amurense* rather exhibited blood elevating activity. The *Siler divaricatum* and *Xanthium strumarium* showed no significant effect. Graphic expression was also made in Figure 1. The average blood pressure of positive control group (propranolol administered) showed about 167 mmHg just before drug administration. During administrating propranolol, 75mg/kg/rat/day, blood pressure began to decrease from the third days and the decrease continued up to 14th day, blood pressure appeared to increase slightly to the average blood presure. The blood lowering trends caused by administrating of *Acanthopanax sessiliflorum* and *Atracylodes japonica* extracts appeared to be similar with that of propranolol administration. However, it is unknown what caused such blood pressure elevation after 14th day, although administation of propranolol

Table 1.

Scientific names	Family names	Parts of plants	Activities
Acanthopanax sessiliflorum	Araliaceae	Cortex Radicis	+
Atractylodes japonica	Compositae	Rhizoma	+
Gastrodia elata	Orchidaceae	Rhizoma	—
Siler divaricatum	Umbelliferae	Rhizoma	0
Xanthium strumarium	Compositae	Fructus	0
Phellodendron amurense	Rutaceae	Cortex	—

* Each ethanol extract was p.o. administered once daily for 20 days.
* (+): blood pressure lowering (0): no activity (—): blood pressure increasing

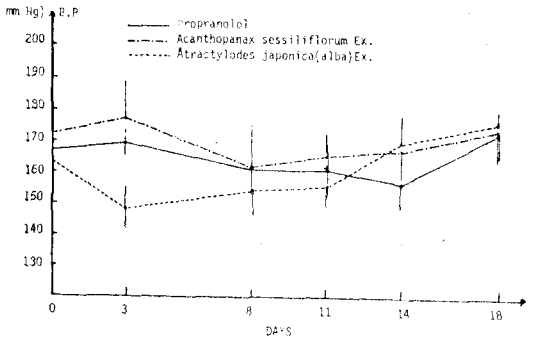

Fig. 1. The blood pressures of day 0 are average blood pressures measured 4 times during 2 weeks before drug or extracts administered. propranolol, dose of 75mg/kg/rat/day extracts, dose of 600mg/kg/rat/day

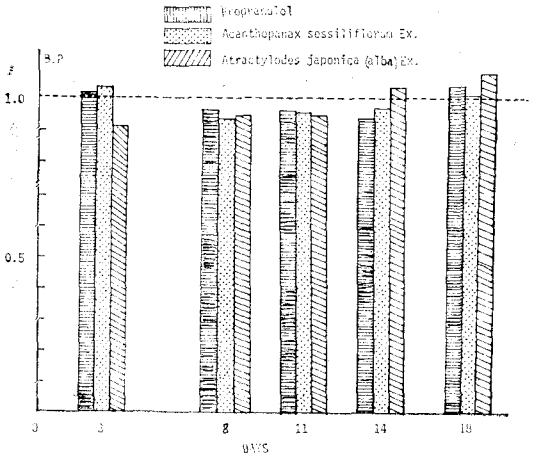

Fig. 2. Fractional expression of blood pressure. expressed by relative fractions compared with the blood pressure of day 0.

and these two plants extracts continued for 4 days further. In order to eliminate possible errors during experiments, all rats were preconditioned for two weeks in the air-conditioned laboratory and were placed in thermoregulated box during blood pressure measurement. In addition, the measurement of blood pressure of each group was carried out at same hour in day to avoid large blood pressure variation possibly caused by *circadian rhythm*.[4] Antihypertensive activity of two plants extracts was compared with that of propranolol and was expressed in Figure 2. Two plants extracts appeared to exhibit similar blood lowering trends with that of propranolol. It should be noted that propranolol showed very potent antihypertensive activity to human, moreover, the dose of 75 mg/kg/rat/day was far beyond normal human dose. However, it appeared to be weak antihypertensive agent to Okamoto-SHR. In addition, it was found that reserpine exhibited potent antihypertensive activity to this animal model (unpublished). Therefore, it may be desirable to use reserpine as a positive control for this animal model. In order to ascertain the antihypertensive activity of two plants extracts, *Acanthopanax sessiliflorum* and *Atractylodes japonica* (alba) extracts, further fractionation of these plants extracts and long term experiments and being undertaken in our laboratory.

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