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Effects of Ya-hom on blood pressure in rats

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Abstract

The effects of Ya-hom, a traditional Thai herbal formulation, on blood pressure were evaluated to verify its use for fainting treatment. Ya-hom has several recipes, which are composed of different medicinal plants in varying ratio. We have selected the most popular commercial preparation to determine the effect on the blood pressure in rats. The water extract of Ya-hom at doses of 0.2, 0.4, 0.6 and 0.8 g/kg initially transiently decreased pressure and over time, increased blood pressure. The duration of the Ya-hom effect on decreasing and increasing blood pressure was dose dependent. The time to maximal effect of Ya-hom on increasing blood pressure was also dose dependent. Phentolamine attenuated the blood pressure decreasing effect but did not affect the blood pressure increasing effect of Ya-hom. Ya-hom was previously shown to increase aortic ring contraction, which was partially inhibited by phentolamine, and increased atrial contraction. It is possible that phentolamine inhibits the effect of Ya-hom on vascular smooth muscle contraction resulting in a prominent positive inotropic effect. This may be the same reason that phentolamine does not influence the effect of Ya-hom on increasing blood pressure. The dominant effect of Ya-hom on increasing blood pressure supports the use of Ya-hom for the treatment of fainting.

Keywords: Blood pressure; Norephinephrine; Phentolamine; Ya-hom

1. Introduction

Ya-hom, a folk formula, has been used in Thailand for more than 50 years for the treatment of fainting. Ya-hom is sold in the market under different trade names with different compositions as well as different proportions of medicinal plants. There are few reports on the effect of Ya-hom in animal or human cardiovascular function. Ya-hom slows the pulse rate and widens the pulse pressure in humans (Matangkasombat, 1973). In rat, the water-soluble fraction of chloroform extract and water extract of Ya-hom raises blood pressure whereas the alcohol extract and water-insoluble fraction of chloroform extract lower blood pressure (Matangkasombat, 1974). In addition, Ya-hom extracts have a direct stimulating effect on the rat heart whereas they have no effect on the rabbit heart (Matangkasombat, 1974). Other reports using water extraction indicate that four brands of Ya-hom decrease blood pressure but have no effect on the heart rate, pulse pressure and electrocardiogram in rats (Wangmad et al., 1986). In another study comparing these four brands of Ya-hom, one has a positive inotropic effect, one has a negative chronotropic effect, a third has both these effects while a fourth has no effect on the isolated atrium (Na Pattaloong and Sawasdimongkol, 1995). Due to these controversial results, the effect of Ya-hom on the cardiovascular function is not conclusive. This difference may be due to the different brands using diverse, extraction methods and experimental models. Since most of Ya-hom formulas contain similar major ingredients, the most popular brand of Ya-hom has been selected for this study on the effects on rat blood pressure. The pharmacological actions of this brand have never been reported. A massive single preparation of lyophilized water extract of Ya-hom was prepared for the

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experiments in order to reduce the variation of each extraction.

2. Materials and methods

2.1. Chemicals

Urethane was obtained from Merck, Darmstadt, West Germany. Histamine, carbachol, hemoglobin, pepsin, bovine serum albumin, chondroitin sulfate and Alcian blue 8 GX were purchased from Sigma Chemical Co., St. Louis, USA. Sodium hydroxide was purchased from Carlo Erba, Milano, Italy. Other reagents were of analytical grade.

2.2. Ya-hom

Ya-hom was obtained from Five Pagodas Pharmacy Co. Ltd., Thailand. One hundred grams of Ya-hom contains *Agastache rugosa* (Fisch. et Mey) O. Kuntze (whole plant, Labiatae) 7.1 g, *Acorus gramineus* Soland (rhizomes, Araceae) 3.5 g, *Lysimachia foenum-graecum* Hance (whole plant, Primulaceae) 3.3 g, *Citrus nobilis* Lour. (outer yellow rind of the ripe fruit, Rutaceae) 7.1 g, *Magnolia officinalis* Rehd. et Wils. (bark of stem, Magnoliaceae) 11.8 g, *Cinnamomum cassia* Presl (Chinese cinnamon, bark, Lauraceae) 7.1 g, *Mentha arvensis* L. (Japanese mint, whole plant, Lamiaceae) 3.5 g, *Asarum sieboldii* Miq. (whole plant, Aristolochiaceae) 2.3 g, *Ligusticum wallichii* Franch. (rhizomes, Umbelliferae) 9.3 g, *Glycyrrhiza glabra* L. (licorice, rhizomes, Leguminosae) 4.8 g, *Eugenia caryophyllata* Thunb. (clove, flower-bud, Myrtaceae) 7.1 g, *Saussuria lappa* Clark (rhizomes, Compositae) 7.1 g, *Aquilaria agallocha* Roxb. (wood, Thymelaeaceae) 7.1 g, *Atractylis ovata* Thunb. (rhizomes, Compositae) 9.3 g, menthol 4.7 g, Borneo camphor 1.4 g, *Angelica anomala* Lallem (rhizomes, Umbelliferae) 3.5 g.

2.3. Lyophilized Ya-hom water extract

Ya-hom powder was mixed with boiled distilled water in the ratio of 1 kg: 10 L and continuously boiled for 15 min. Ya-hom extract was filtered through cotton muslin cloth. The filtrate was lyophilized and kept at −20 °C. One gram of Ya-hom powder yielded 0.136 g of lyophilized product. The test solution was freshly prepared by dissolving the lyophilized product in distilled water.

Lyophilized Ya-hom water extract was dissolved in methanol, sonicated for 20 min and then adjusted to the concentration of 0.01 g/mL with methanol. Sample was filtered through Sep-pack® C18 cartridge before applying to HPLC using LiChrosphere® 100RP-18, Merck (5 μm) column and eluted with deionized water for 5 min and followed by linear gradient of 10–100% acetonitrile for 15 min. HPLC analysis of lyophilized Ya-hom water extract was showed in Fig. 1.

2.4. Animal

Male Wistar rats weighing between 200 and 220 g were obtained from the National Laboratory Animal Center at Salaya, Mahidol University. Rats were housed in hanging cage in the animal room at Faculty of Pharmacy, Mahidol University for at least 1 week prior to the experiment. The animals were fed with commercial rat diet (C.P. Mice Feed; SWT. Co. Ltd., Thailand) and tap water ad libitum. The rats

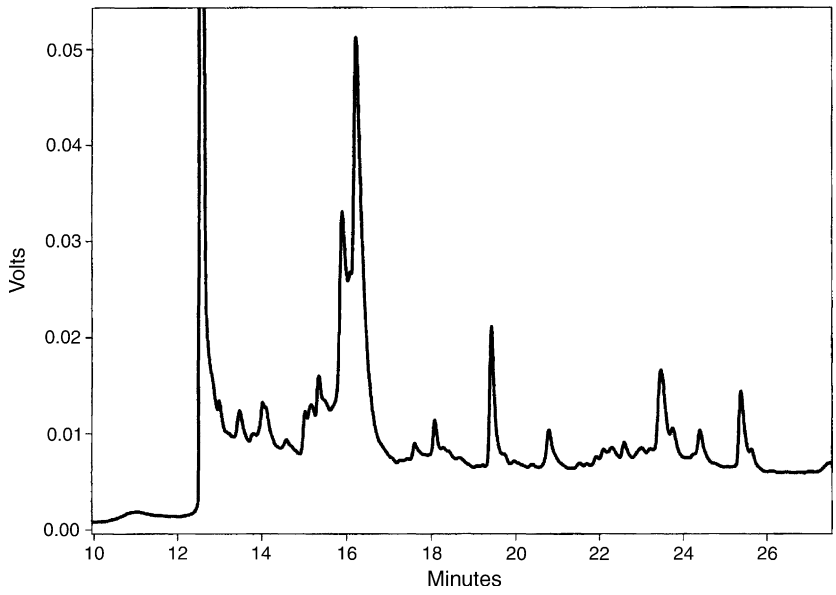

Fig. 1. HPLC analysis of lyophilized Ya-hom. Lyophilized Ya-hom in methanol was applied to HPLC using LiChrosphere® 100RP-18, Merck (5 μm) column and eluted with deionized water and linear gradient of 10–100% acetonitrile.