We previously reported that hypotensive substances could be obtained from various plants by hot water extraction (Okamoto, et al., Jap Heart J 20: 793, 1979; Murakami, et al., Jap Heart J 20: 794, 1979). We have extended our search to other plants. This paper describes our study on the hypotensive effects of these extracts, and the results of fractionation and purification of effective substances.

Materials and Methods From 50 plants, 57 items, including weeds, daily foods, medicines and citrus peels, were examined. Plant samples were homogenized using a mixer, 10 volumes of hot water was added, and the mixture stirred for 30 min. at 96°C. For samples of cornhusk, corncob and tassel, 5 volumes of hot water was added and the mixture heated for 3 hrs. at 100°C. The supernatant was fractionated on Sephadex column in accordance with our previously reported method (referenced above) and then lyophilized. The effective fraction from cornhusk was fractionated on a column of silica gel (Wako gel C-200), and eluted with CHCl₃-CH₃OH=10:1, 5:1, 4:1, 2:1 and CH₃OH. These were lyophilized following condensation.

The substances were administrated to SHR and SHRSP (blood pressures of 170 to 220 mmHg). Blood pressure was measured chronologically using the tail-pulse pick up method without anesthesia.

Results (1) Intravenously (dose 10mg/100g), extracts from cornhusk, corncob, tassel, okra, Solidago altissima L. (leaves), asparagus and bamboo leaves showed marked falls of blood pressures during screening tests. (2) The extract of Solidago altissima L. was fractionated by gel filtration on Sephadex G-50 and separated into two fractions (A₁ and A₂). Both high (A₁) and low (A₂) molecular fraction showed hypotensive effects, but the effect of former was more potent. Blood pressures of SHR and SHRSP showed falls of about 70 mmHg 6 hrs. after injection when fraction A₁ was injected subcutaneously or intravenously (dose 3.5mg/100g). In intravenous administration, blood pressure decreases of 40 to 60 mmHg were found even after 4 days. Intragastrically (dose 50mg/100g), blood pressures showed falls of 40 to 50 mmHg 6 hrs. after administration. (3) When cornhusk, corncob and tassel extracts fractionated by gel filtration were injected intravenously (dose 5mg/100g), hypotensive effects were found in both fractions but those with molecular weights of under 1,000 were stronger. In the fractions from cornhusk and corncob with molecular weights of under 1,000, the blood pressures of SHR and SHRSP showed falls of 31 to 50 mmHg at 30 min. after injection. (4) From the cornhusk, which showed the most potent hypotensive effects, we further fractionated the effective fraction by silica gel chromatography. Hypotensive effects were found in the fractions of CHCl₃-CH₃OH=5:1 (I), 4:1 (II) and 2:1 (III). Fraction II and III were purified by passing through a column of Sephadex G-25 fine and then crystallized from ethanol. Fraction II showed a minimum of 233 nm and maximum 261 nm in the UV absorption spectrum; the only detected carbohydrate was D-ribose. On the other hand, the UV spectrum of fraction III showed an absorption minimum of 233 nm and a maximum of 254 nm; sugar analysis revealed only D-ribose. On the basis of mp, UV, IR, NMR and MS spectral data, these compounds (II and III) were identified as adenosine and guanosine.

Summary Screening tests for hypotensive substances were conducted on 57 plants. Intravenous administration of fractions from Solidago altissima L. (leaves), asparagus, okra, cornhusk, corncob, tassel and bamboo leaves showed falls in blood pressure in SHR and SHRSP, especially the first marked and continuous falls. Furthermore, extracts from Solidago altissima L. and cornhusk were fractionated on columns of silica gel and Sephadex G-50. The crystalline compounds in the cornhusk fraction were identified as adenosine and guanosine. In addition, the hypotensive substance of fraction A₁ from Solidago altissima L. may be a glycoprotein with a molecular weight of over 10,000.

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