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PURINE CONTENTS OF SOYBEAN-DERIVED FOODS AND SELECTED JAPANESE VEGETABLES AND MUSHROOMS

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□ *Purine contents of soybean-derived food and various other Japanese foods were quantitatively determined by high-performance liquid chromatography (HPLC). Purine contents were as follows: soybean-derived foods, 21.9–172.5 mg/100 g or 100 mL; Japanese vegetables, 2.3–171.8 mg/100 g; Japanese mushrooms, 9.5–142.3 mg/100 g. Since purine levels in these foods did not exceed 200 mg/100 g, we recommend that eating of them should be adopted and good dietary habits followed.*

Keywords Purine contents; Japanese foods; soybean-derived foods; HPLC

INTRODUCTION

Hyperuricemia can, in many instances, be related to daily diet. Higher levels of meat and seafood consumption are reported to be associated with increased risk of gout.^[1] Meat and seafood contain large amounts of purines and are thus classified as purine-rich foods. Since total protein intake is not associated with serum uric acid levels,^[2] intake of purines is considered to be the main dietary cause of elevated serum uric acid levels. To help in controlling serum uric acid levels, gouty patients should avoid overeating, particularly purine-rich foods. Soybeans contain slightly higher purine levels than other beans, and various soybean-derived foods are available in Japan. As such foods are considered healthy, many people eat soybean-derived food daily. In this study, we report the purine contents of soybean-derived foods and various other Japanese vegetables and mushrooms.

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MATERIALS AND METHODS

Soybean-derived foods, selected vegetables, and mushrooms were purchased from a supermarket. Purine bases in these foods were quantitatively determined by HPLC. Samples (1–10 g) of each food were homogenized and frozen before lyophilization. After hydrolysis with 70% perchloric acid in boiling water, adenine, guanine, hypoxanthine and xanthine levels were determined. HPLC conditions were as follows: instrument, Shimadzu LC10A HPLC system; column, Shodex Asahi Pak HQ-310 (5 mm ID and 300 mm length); mobile phase, 150 mM sodium phosphate buffer (pH 2.5); flow rate, 0.6 mL/minute; column temperature, 35°C; and detector wavelength, 260 nm. To eliminate interference from other metabolic

TABLE 1 Purine contents of soybean-derived food and other Japanese foods (mg/100 g or mL)

	Adenine	Guanine	Hypoxanthine	Xanthine	Total
Soybean-derived foods					
Tofu Raw	14.00	16.72	0.43	0.00	31.15
Boiled (3 min)	13.08	8.75	0.00	0.03	21.86
Boiled (5 min)	15.26	19.09	0.66	0.72	35.72
Soybean milk	7.74	11.72	2.49	0.01	21.96
Bean curd lees (<i>okara</i>)	15.02	24.01	4.53	5.04	48.61
Soybean paste <i>aka-miso</i>	3.61	17.95	36.54	5.44	63.54
<i>shiro-miso</i>	0.01	16.45	29.26	3.04	48.76
Soy sauce	0.00	2.46	33.73	8.99	45.18
Dried soybeans	74.30	98.22	0.00	0.00	172.52
Fermented soybeans (<i>natto</i>)	40.53	51.37	6.81	15.21	113.92
Green soybeans	20.76	27.17	0.00	0.00	47.93
Vegetables					
Broccoli (raw)	25.06	33.94	5.65	5.34	69.99
(boiled)	20.47	28.79	1.87	0.65	51.77
Spinach leaves (raw)	29.85	13.83	0.00	7.70	51.38
(boiled)	18.65	13.90	0.00	6.58	39.13
Young leaves (raw)	83.53	88.26	0.00	0.00	171.79
(boiled)	82.74	78.05	0.00	0.00	160.79
Bean sprouts	14.09	14.20	3.23	3.52	35.05
Broccoli sprouts	59.48	57.23	8.13	4.80	129.64
White radish sprouts	33.86	29.44	6.39	3.51	73.19
Gumbo (<i>okura</i>)	17.21	21.30	0.29	0.72	39.52
Perilla leaves (<i>shiso</i>)	19.07	19.15	3.08	0.16	41.45
Garlic	5.98	6.89	3.42	0.75	17.03
Ginger	0.38	1.39	0.00	0.48	2.25
Mushrooms					
Maitake	47.36	38.86	7.88	4.36	98.46
Bunashimeji	9.45	7.96	1.10	2.33	20.84
Shiitake	8.32	10.02	1.62	0.86	20.81
Eringi	5.05	5.34	0.67	2.36	13.42
Nameko	3.78	2.93	1.44	1.35	9.50
Enokidake	29.72	19.64	0.00	0.00	49.37
Hiratake	74.31	68.00	0.00	0.00	142.30

compounds, comparison after enzyme treatment (guanase or xanthine oxidase) was performed.

RESULTS

Purine contents are shown in Table 1. Total purine levels were calculated as the sum of purine base levels. Vegetables containing more than 50 mg of purines per 100 g weight were considered to be purine-rich vegetables.

DISCUSSION

In Japan, lifestyle guidance in treating hyperuricemia is included in the Guidelines for the Management of Hyperuricemia and Gout.^[3] The major points are (1) reduction of obesity, (2) dietary therapy, (3) restriction of alcohol intake, (4) adequate exercise, and (5) reduction of stress. For gouty or hyperuricemic patients, dietary purine intake of less than 400 mg per day is recommended. Since purine levels in soybean-derived foods and selected Japanese vegetables and mushrooms are not large (less than 200 mg/100 g), we recommend that eating these foods should be adopted and good dietary habits encouraged.

REFERENCES

1. Choi, H.K.; Atkinson, K.; Karlson, E.W.; Willett, W.; Curhan, G. Purine-rich foods, dairy and protein intake, and the risk of gout in men, *N. Engl. J. Med.* **2004**, 350, 1093–1103.
2. Choi, H.K.; Liu, S.; Curhan, G. Intake of purine-rich foods, protein, and dairy products and relationship to serum levels of uric acid, *Arthritis Rheum.* **2005**, 52, 283–289.
3. Hosoya, T.; Ueda, T.; Kamatani, N.; Nakajima, H.; Hisatome, I.; Fujimori, S.; Yamanaka, H.; Yamamoto, T. Lifestyle guidance. In *Guidelines for the Management of Hyperuricemia and Gout*. Committee for the Preparation of Guidelines for the Management of Hyperuricemia and Gout, eds, Tokyo, **2002**, pp. 29–32.