

Dietary Habits and Lifestyle Factors in Relation to *Sa-Sang* Constitution

Jeongseon Kim[§], Hye-Jung Kang, Ee-Hwa Kim¹

Department of Oriental Medical Food and Nutrition, Semyung University, Chechon, Chungbuk 390-711, Korea

¹College of Oriental Medicine, Semyung University, Chechon, Chungbuk 390-711, Korea

According to *Sa-Sang* constitution, people can be classified into 4 types, *Tae-Yang-In*, *Tae-Eum-In*, *So-Yang-In*, and *So-Eum-In*. The purpose of this study was to examine any significance between types of *Sa-Sang* constitution and dietary factors. Physical and constitutional examinations as well as a questionnaire survey were conducted on a group of 483 college students. Among the group of 483 college students, only 428 subjects were determined to have identical constitution through both the questionnaire survey and Korean traditional medical doctors' inquiries. Of 428 subjects, 29.7% were determined to be *Tae-Eum-Ins*; 35.5% were identified as *So-Yang-Ins*; 34.8% were classified as *So-Eum-Ins*. *Tae-Eum-Ins* showed a statistically significant difference in BMI and higher smoking rate in comparison with groups of *So-Yang-Ins* and *So-Eum-Ins*. *So-Eum-Ins* had a tendency to take vegetables and fruits more often but they had lower preferences for balanced diets. *Tae-Eum-Ins* showed higher propensity to eat a visible fat protein. In terms of degrees of doneness of meat, *So-Yang-Ins* showed a higher tendency to prefer well-broiled meat. *Tae-Eum-Ins* also tended to have significantly higher iron, potassium, sodium, vitamin B₁, niacin, β -carotene and vitamin E in their diet. *So-Eum-Ins* had significantly lower intakes of protein, phosphorous, and folate. Considering the fact that most chronic degenerative diseases could be developed by any lifestyle factors, it is necessary to conduct educational programs about lifestyles including dietary habits for maintaining good health. On the basis of the results of this study, it is expected that the scientific, objective and accurate diet information depending upon individual's type of constitution will be provided.

Key words : Demographics, BMI, Dietary habits, Food frequency, Nutrient intakes, *Sa-Sang*

Received March 9, 2005; Revised May 2, 2005; Accepted May 18, 2005

INTRODUCTION

According to the Korean traditional medical science, one's constitution can be classified into 4 types: *Tae-Yang-In* {a person with a *Tae-Yang* (Great Solar) type of *Sa-Sang* constitution}, *Tae-Eum-In* {a person with a *Tae-Eum* (Great Lunar) type}, *So-Yang-In* {a person with a *So-Yang* (Small Solar) type}, and *So-Eum-In* {a person with a *So-Eum* (Small Lunar) type}.¹⁾ In *Sa-Sang* constitution-based medical science, the intake of right food is emphasized as an important factor for preventing any disease from getting worse or developing any complication. It tries to promote health of a patient by recovering the vitality of the patient's body through the intake of foods after a disease is treated with medications to a certain degree.^{2,3)} Therefore, it has established a principle of meals in consideration of the health condition, the envi-

ronment of a patient and a season. Furthermore, it has practiced alimentotherapy on the basis of the theory that four natures (warm, cool, cold, and hot) and five tastes (sour, bitter, sweet, pungent, and salty) of food which it considers to act on human. Like this, such dietetics as considered in the Korean traditional medical science has a different viewpoint of food from current dietetics. However, both traditional Korean medical science and current dietetics consider balanced nutrition as an important factor to maintain healthy life. If characteristics and the alimentotherapy according to each constitution are examined, the results are as follows:⁴⁾

For a *Tae-Yang-In*, clear, insipid, and plain foods are good because it is believed that such foods strengthen liver. Particularly, it is said that marine products or vegetables, which are plain and low in fat, are good for a *Tae-Yang-In*. Since any relatively pungent and warm food or any high fat and heavy food is bad for a *Tae-Yang*, he/she is prohibited from taking it.

[§] To whom correspondence should be addressed.
(E-mail : jskim620@semyung.ac.kr)

A *Tae-Eum-In* has a constitution that a disease may be developed in the respiratory system or the circulatory system. Furthermore, a *Tae-Eum-In* is of a constitution that he/she is apt to be fat and has any cardiovascular disease, such as hypertension or any adult disease, such as paralysis. It is, therefore, said that he/she has to avoid taking any spicy food, or any high fat food or any pungent and warm food. It is also said that since a *Tae-Eum-In* is of a constitution in which his/her frame is relatively sturdy, his/her stomach function is good. Hence, he/she has a good taste and eats food well, and thus animal and vegetable proteins or any heavy food with high calorie are good.

A *So-Yang-In* is of a constitution that there is a heat in the spleen and the stomach, and thus, he/she has a characteristic to dislike any hot and pungent food. Fresh and cold food or vegetables and marine products are good for him/her, and any food for strengthening the *Yin* energy is recommended. Moreover, he/she is prohibited from taking any spicy and high-flavored food and any pungent and hot food, and he/she is advised to avoid taking spices.

A *So-Eum-In* is of a constitution that the spleen and the stomach are so weak that a *So-Eum-In* can easily develop digestive troubles. Therefore, any food that can be digested relatively easily and that is warm is good for him/her. It is also said that if any spicy and fragrant seasoning is used without putting too much of oil to any food or making it smooth and flat when it is cooked, it arouses his/her appetite and also helps digestion. Also, he/she is made to avoid taking any heavy food that is not digested well, or any high-fat food and cold food.

For the purpose of grafting the Korean traditional medical science on current dietetics, this study was to investigate any significance between types of *Sa-Sang* constitution and dietary factors. This study was also to examine demographic factors and dietary habit and to identify their usual diet intakes through a food frequency questionnaire based on the types of *Sa-Sang* constitution.

METHOD

1. Subjects

This study was conducted on 483 students (239 males and 244 females) of Semyung University during the study period from September till December, 2002. A written consent to participation in the study was collected from the subjects before the study was commenced.

2. Method

To ensure the appropriateness and the reliability of diagnosing constitutions of each participant, the study was conducted only on 428 students (210 males and 218 females) for whom both a Korean traditional medical doctor and the questionnaire were identified as belonging to the same constitution. The subjects were then asked in respect of demographic information, life style, dietary habit, and usual diet intakes.

1) *Classifying into Sa-Sang constitutions*

Primarily, each participant's constitution was classified by Questionnaire for *Sa-Sang* Constitution Classification II (QSCC II), which was deemed to be scientifically and systematically developed and has been currently used for the classification of constitution in numerous studies.⁵⁻⁷⁾ It was then finally classified and identified through a Korean traditional medical doctor's inquiry.

QSCC II comprises 15 questions on body types, characters and lifestyle and 106 questions on the ability to manage affairs and personal relations, usual mental attitude and problems, emotional characteristics, behavioral characteristics and physical condition.

A trained researcher completed the survey by interviewing each participant.

2) *Demographic information*

Inquiries were made about demographic information on age and gender of each participant, average monthly income of each household, smoking and alcohol consumption habits.

3) *Anthropometric measurement*

Each participant's height and weight were measured by using an automated height and weight measuring machine and the participant's body mass index {BMI = Weight (kg)/Height²(m²)} was calculated.

4) *Biochemical analysis of blood*

Blood was analyzed according to protocols in Semyung University-affiliated Oriental Medical Hospital. In order to measure hemoglobin, hematocrit, total protein, albumin, total triglycerides, total cholesterol, HDL-cholesterol, leukocyte and content of blood glucose, venous blood of 15cc was collected after 12-hour fasting. A portion of blood was used for measuring hemoglobin, hematocrit and leukocyte. Another portion of blood was centrifuged for 20 minutes at 3,200 rpm and kept in a freezer at -70 °C until analysis. Serum total protein and albumin concentrations were measured by using a kit for developing a

color through biuret reaction and dye-binding with BCG, respectively. Serum total triglycerides and total cholesterol concentrations were measured through the enzyme technique by using the reflectron system of Boehringer Mannheim. HDL-cholesterol concentration was measured by the heparin-Mn precipitation method, and blood glucose concentration was measured through the enzyme technique by using an automatic analyzer.

5) *Inquiries about dietary habit*

An inquiry about the dietary habit was made through questions on : whether any dietary supplement is taken, frequency of meals in a day, whether the participant regularly eats breakfast, frequency of dining out, regularity of meals, whether any high-fat food is taken, whether any processed food is consumed, whether vegetables and fruits are consumed, whether the participant's diet is balanced, whether any fried food or any oil-broiled food is preferred, a method for providing information on health and dietary life, a degree of using the knowledge of nutrition in daily life, preference of a method of cooking meat, preference of a degree of roasting meat, preference of a method of cooking, a degree of removing fat from meat, and so on.

In dietetics of the times, a food frequency questionnaire (FFQ) was developed for the purpose of identifying dietary factors as a cause of developing a disease, and it was used in analyzing the intake condition of ordinary foods and nutrients.⁸⁾ For this analysis, the FFQ has ever been developed to measure usual dietary intakes of which the appropriateness and the reliability have been verified by selecting foods supplying 90% of total content of each nutrient from foods that people usually consumed.^{9,10)}

The subjects were instructed to answer the frequency and the portion size of such food as taken for the last one year as exactly as possible by trained interviewers. In questions on food intake frequency, subjects were asked to answer frequencies in 9 scales (never eaten, once per a month, 2~3 times per a month, 1~2 times per a week, 3~4 times per a week, 5~6 times per a week, once per a day, twice per a day, 3 times per a day). Daily nutrient intakes were then calculated from the frequency of the particular nutrient's intake and the portion size of the nutrient in each consumption using computer program.^{9,10)}

6) *Statistical process*

Statistical process of all data obtained through the research was made by SPSS version 11.0 to produce the

mean value and the standard deviation.¹¹⁾ In order to examine any significance between *Sa-Sang* constitutions and genders, monthly household income, alcohol consumption, and vitamin/mineral supplement use, the distribution of responses was analyzed, using corrected χ^2 statistics. The significance of the mean value of each group after analysis of single variance was verified at the level of $\alpha < 0.05$ by using the general linear model procedure through the Duncan's multiple range test.¹²⁾

RESULTS

1. Demographic Profile

Demographic information about subjects in the study is shown in Table 1. Their ages were in the range of 18 to 28, and their mean age was 20.8. Male subjects were 210 (49.1%) and female ones were 218 (50.9%).

In the distribution of *Sa-Sang* constitution, *Tae-Eum-Ins*, *So-Yang-Ins*, and *So-Eum-Ins* were 127 subjects (29.7%), 152 (35.5%) and 149 (34.8%), respectively. In the aspect of the monthly income per household, over two-thirds of the subjects (69.4%) fell under the categories of 1~3 million won.

As shown in Table 1, common demographic parameters, such as age, gender, and the average monthly income per household, did not show any significant difference depending upon *Sa-Sang* constitution-based classification. Since there were no statistical differences according to age or gender, the data were divided into three groups and analyzed by taking only constitution types into consideration.

2. Anthropometric Measurements

As shown in Table 1, *Tae-Eum-Ins* showed a significantly higher body weight and BMI in comparison with *So-Yang-Ins* and *So-Eum-Ins*. The mean BMI of subjects was 21.4 kg/m². The ranges of height and weight were 150-187 cm and 41-115 kg, respectively. BMI was a parameter showing a significant difference depending upon a type of *Sa-Sang* constitution.

3. Lifestyle

Among the subjects, 133 subjects equivalent to 31.1% of all subjects smoked. *Tae-Eum-Ins* showed higher smoking rate (40.9%) than the other types of *Sa-Sang* constitution (*So-Yang-Ins* : 33.6%; *So-Eum-Ins*: 20.1%). Most of them (94.6%) responded that they regularly consumed alcohol. To the question on dietary supplement use, only 12.4% of all subjects answered that they took

dietary supplements regularly. Alcohol consumption and vitamin/mineral supplements use did not show any significant difference depending upon a type of *Sa-Sang* constitution.

4. Biochemical Analysis of Blood

The results of the blood test conducted on subjects are shown in Table 2. No value item of the blood test

showed a difference depending upon *Sa-Sang* constitution.

5. Dietary Habit

Table 3 explains information relating to the dietary habit of subjects: frequency of vegetables and fruits consumption, whether the diet is balanced, whether any fat portion is removed from the meat before it is consumed, and preference of a cooking method of meat.

Table 1. Demographic Profiles according to *Sa-Sang* Constitution(N = 428)

Variable	Tae-Eum 127 (29.7) ¹⁾	So-Yang 152 (35.5)	So-Eum 149 (34.8)	Total	P
Age ²⁾	20.8±2.3	20.7±1.7	20.8±1.8	20.8±1.9	0.642
Gender					0.450
Male	69 (16.1)	66 (15.4)	75 (17.5)	210 (49.1)	
Female	58 (13.8)	86 (19.9)	74 (17.3)	218 (50.9)	
Monthly household income (unit : million won)					0.744
< 1	9 (2.1)	16 (3.7)	14 (3.3)	39 (9.1)	
1-2	39 (9.1)	54 (12.6)	34 (7.9)	127 (29.7)	
2-3	56 (13.1)	46 (10.7)	68 (15.9)	170 (39.7)	
3-4	17 (4.0)	25 (5.8)	19 (4.4)	61 (14.3)	
>4	6 (1.4)	11 (2.6)	14 (3.3)	31 (7.2)	
Height (cm)	168.9±8.7	166.4±8.1	166.3±7.8	167.1±8.2	0.117
Weight (kg)	67.2±12.4 ^{a3)}	57.1±9.5 ^b	56.8 ± 8.0 ^b	60.0±10.9	< 0.001
BMI (kg/m ²)	23.4±2.9 ^a	20.8±1.7 ^b	20.5 ± 2.3 ^b	21.4±2.7	< 0.001
Smoking					0.029
No	75 (17.5)	101 (23.6)	119 (27.8)	295 (68.9)	
Yes	52 (12.1)	51 (11.9)	30 (7.0)	133 (31.1)	
Drinking alcohol					0.360
No	9 (2.1)	4 (0.9)	10 (2.3)	23 (5.4)	
Yes	118 (27.6)	148 (34.6)	139 (32.5)	405 (94.6)	
					0.637
No	115 (26.9)	130 (30.4)	130 (30.4)	375 (87.6)	
Yes	12 (2.8)	22 (5.1)	19 (4.4)	53 (12.4)	

1) N (%)

2) mean ± standard deviation (SD)

3) Values with different letters in a row mean statistically significant differences at $\alpha = 0.05$ by Duncan's multiple test.

Table 2. Biochemical Indices according to *Sa-Sang* Constitution (n = 428)

Variable	Tae-Eum	So-Yang	So-Eum	p
Hemoglobin (g/dl)	14.35±1.90	14.25±2.16	14.03±1.78	0.631*
Hematocrit (%)	42.29±4.58	42.34±4.33	41.72±4.17	0.660
Total protein (g/dl)	7.16±0.26	7.16±0.37	7.23±0.46	0.449
Albumin (g/dl)	4.46±0.22	4.48±0.23	5.06±0.64	0.352
Total triglycerides (mg/dl)	96.82±55.33	91.07±60.70	89.96±65.69	0.791
Total cholesterol (mg/dl)	167.65±33.93	171.49±44.04	162.59±34.32	0.387
HDL-cholesterol (mg/dl)	53.80±8.82	54.75±8.21	53.26±7.31	0.554
WBC (count/mm ³)	5972.6±1352.9	6327.9±1778.8	6034.8±1240.5	0.337
Blood glucose (mg/dl)	85.29±8.43	82.97±7.80	84.17±7.36	0.245

*: not significant

Table 3. Dietary Habits according to *Sa-Sang* Constitution (n = 428)

Variable	<i>Tae-Eum</i>	<i>So-Yang</i>	<i>So-Eum</i>	p
Meals per day ¹⁾	2.41 ± 0.53	2.43 ± 0.55	2.42 ± 0.52	0.953
Breakfast ²⁾	1.95 ± 0.70	1.99 ± 0.70	2.03 ± 0.74	0.831
Eat out ³⁾	1.91 ± 0.81	2.04 ± 0.84	2.00 ± 0.81	0.623
Eat meals regularly ⁴⁾	2.16 ± 0.72	2.18 ± 0.81	2.22 ± 0.65	0.890
Food high in fat content ⁵⁾	2.44 ± 0.73	2.49 ± 0.72	2.34 ± 0.83	0.481
Processed food ⁶⁾	2.41 ± 0.81	2.41 ± 0.79	2.28 ± 0.80	0.563
Vegetable/fruit ⁷⁾ *	2.52 ± 0.67 ^a	2.41 ± 0.68 ^a	2.02 ± 0.60 ^b	0.043
Fried food more than twice per week ⁸⁾	1.92 ± 0.72	1.87 ± 0.72	1.96 ± 0.71	0.737
Balanced diet ⁸⁾ ***	1.43 ± 0.69 ^a	1.62 ± 0.65 ^a	1.90 ± 0.76 ^b	<0.001
Apply nutritional information in real life ⁸⁾	2.91 ± 0.79	2.99 ± 0.66	2.88 ± 0.66	0.620
Remove visible fat from meat ⁹⁾ **	1.67 ± 0.50 ^a	1.95 ± 0.59 ^b	2.06 ± 0.58 ^b	0.006
The degree of cooking meat ¹⁰⁾ **	3.33 ± 0.59 ^a	3.51 ± 0.52 ^b	3.12 ± 0.48 ^a	0.007

1) Less than once (coded 1), twice (coded 2), three times (coded 3), more than 4 times (coded 4)

2) Always (coded 1), Sometimes (coded 2), Rare or never (coded 3)

3) Rare or never (coded 1), 1-2 times per week (coded 2), 3-4 times per week (coded 3), More than 5 times per week (coded 4)

4) Not currently nor intend to change irregularity (coded 1), Not currently but intend to change irregularity (coded 2), Yes (coded 3)

5) Yes currently and don't intend to avoid eating it (coded 1), Yes currently and intend to avoid eating it (coded 2), No or unlikely having it currently (coded 3)

6) Likely to eat little and don't intend to eat more (coded 1), Likely to eat little and intend to eat more (coded 2), Likely to eat as much as possible (coded 3)

7) Always/often (coded 1), Sometimes (coded 2), Rare/never (coded 3)

8) Always/often (coded 1), Often (coded 2), Sometimes (coded 3), Rare/never (coded 4)

9) Eat as it is (coded 1), Some (coded 2), Almost all (coded 3)

10) Never eat (coded 1), Rare (coded 2), Medium (coded 3), Well-done (coded)

*, **, *** Values with different letters in a row mean statistically significant differences at $\alpha = 0.05$, $\alpha = 0.01$, and $\alpha = 0.001$ respectively by Duncan's multiple test.

Table 4. Nutrient Intakes according to *Sa-Sang* Constitution (n = 428)

Nutrient	<i>Tae-eum</i> ¹⁾	<i>So-yang</i>	<i>So-eum</i>	p
Energy (kcal)	2601.9±1176.7	2496.0±1103.6	2366.4±847.2	0.410
Protein (g)***	95.72±51.19 ^{a2)}	89.73±45.40 ^a	81.96±36.24 ^b	<0.001
Fat (g)	62.20±38.42	58.37±32.18	53.67±28.54	0.311
Carbohydrate (g)	405.9±164.0	399.1±170.9	379.1±126.3	0.375
Ca (mg)	671.3±382.6	657.2±373.0	587.4±344.2	0.338
P (mg)**	1304.2±691.1 ^a	1242.0±631.2 ^a	1131.0±546.6 ^b	0.004
Fe (mg)**	17.89±9.30 ^a	16.71±8.85 ^b	15.56±7.10 ^b	0.007
K (mg)**	3303.4±1796.7 ^a	3108.2±1677.3 ^b	2854.3±1411.4 ^b	0.003
Vitamin A (ug RE)	703.6±409.7	629.4±379.5	627.8±392.0	0.439
Na (mg)***	4971.8±2825.4 ^a	4545.5±2811.3 ^b	4143.2±2087.6 ^b	<0.001
Vitamin B1 (mg)*	1.86±0.93 ^a	1.64±0.79 ^b	1.44±0.67 ^b	0.027
Vitamin B2 (mg)	1.59±0.91	1.48±0.78	1.42±0.70	0.448
Niacin (mg)***	13.14±7.36 ^a	11.75±6.05 ^b	10.89±5.34 ^b	<0.001
Vitamin C (mg)	127.6±95.0	124.9±85.5	118.4±78.2	0.807
Zn (ug)	12.21±5.97	11.57±5.55	10.84±4.37	0.315
Vitamin B6 (mg)	1.78±0.66	1.75±0.77	1.69±0.68	0.746
Folate (ug)**	275.9±152.4 ^a	257.9±150.3 ^a	235.0±120.3 ^b	0.004
Retinol (ug)	162.8±106.6	156.1±104.1	148.7±100.7	0.712
β-Carotene (ug)*	4063.0±2362.3 ^a	3676.9±2384.4 ^b	3484.1±1754.9 ^b	0.034
Fiber (g)	7.64±4.02	7.29±4.09	6.74±3.28	0.362
Vitamin E (mg)*	16.43±9.76 ^a	15.43±9.46 ^b	13.88±7.90 ^b	0.041
Cholesterol (mg)	343.3±199.7	300.9±215.3	322.5±196.6	0.616

1) All nutrients were tested after controlling for age, gender, and energy intake using general linear model.

2) Values with different letters in a row mean statistically significant differences at $\alpha = 0.05$ by Duncan's multiple test.

*, **, *** Values with different letters in a row mean statistically significant differences at $\alpha = 0.05$, $\alpha = 0.01$, and $\alpha = 0.001$ respectively.

So-Eum-Ins had a tendency to take vegetables and fruits more often than the other types of *Sa-Sang* constitution, but a propensity that *So-Eum-Ins* had an unbalanced diet was significantly higher in comparison with the other types of *Sa-Sang* constitution. When a degree of roasting meat was indicated by a score, *So-Yang-Ins* showed higher scores (a tendency that he/she ate such meat as completely roasted). *Tae-Eum-Ins* showed that their propensity to eat a visible fat portion as it is was higher than the other types of *Sa-Sang* constitution.

6. Nutrient Intakes

Table 4 shows the results of calculating daily nutrient intakes through the frequency and quantity of each food consumed. After controlling for age, gender, and caloric intake, *Tae-Eum-Ins* also had significantly higher intakes in iron, potassium, sodium, vitamin B₁, niacin, β -carotene and vitamin E. *So-Eum-Ins* had significantly lower intakes in protein, phosphorous, and folate.

DISCUSSION

1. General Characteristics of Subjects

According to *Dong-Eui-Su-Se-Bo-Won*, the distribution pattern of each *Sa-Sang* constitution is not related to the gender composition of the group.¹⁾ It is also said that the distribution of each type of *Sa-Sang* constitution per a population of 10,000 was as follows: 3~4 persons had a *Tae-Yang* type of *Sa-Sang* constitution, 5,000 persons (50%) had *Tae-Eum* type of *Sa-Sang* constitution, 3,000 persons (30%) had *So-Yang* type and 2,000 persons (20%) had *So-Eum* type. The studies on *Sa-Sang* constitution of adults showed that, on average, *Tae-Yang* constitution was 0%, *Tae-Eum* constitution was 50%, *So-Yang* constitution was 25%, and *So-Eum* constitution was 25%.¹³⁻¹⁵⁾ On the other hand, the study on *Sa-Sang* constitution of people aged 100 or more showed the distribution that *Tae-Yang* constitution was 0%, *Tae-Eum* constitution was 17.0%, *So-Yang* constitution was 73.2%, and *So-Eum* constitution was 9.8%.¹⁶⁾ Hence it is shown that a large population had *Tae-Eum* constitution, while a small number of people had *So-Eum* constitution. The study on *Sa-Sang* constitution of college students showed the distribution that *Tae-Eum-Ins* were 26.3%, *So-Yang-Ins* were 20.1%, and *So-Eum-Ins* were 50.6%, which showed that a large number of students were *So-Eum-Ins*. Therefore, such distribution was different depending upon the group of subjects in the study.^{1,17)}

2. Anthropometric Measurements

In a study on physical measurements of people aged 65 or more, it was reported that in the male group, the BMI was $24.7 \pm 2.1 \text{ kg/m}^2$ for *Tae-Eum* constitution, $22.3 \pm 2.7 \text{ kg/m}^2$ for *So-Yang* constitution and $20.4 \pm 2.9 \text{ kg/m}^2$ for *So-Eum* constitution.¹⁷⁾ In the female group, the BMI was $25.7 \pm 3.2 \text{ kg/m}^2$ for *Tae-Eum* constitution, $22.8 \pm 2.1 \text{ kg/m}^2$ for *So-Yang* constitution and $22.6 \pm 3.5 \text{ kg/m}^2$ for *So-Eum* constitution. The study showed that the BMI of *Tae-Eum* constitution was significantly higher than that of *So-Eum* constitution. Also, in another study on physical characteristics of each *Sa-Sang* constitution, it was reported that the BMI, the circumferences of brachial muscles and the circumferences of waists were the greatest in *Tae-Eum* constitution, while the circumferences of shoulders, the circumferences of chests and the circumferences of hips were the least.¹⁵⁾ In addition, a literature on *Sa-Sang* constitution stated that in *So-Yang* constitution, the upper body was weaker than the lower body and particularly, legs were thin and the chest parts were well developed, while in *So-Eum* constitution, the height, the frame and the weight were small and the overall configuration was of a feminine curve.^{4,6,18)} If examined from the viewpoint of *Sa-Sang* constitution-based medical science, it was said that *Tae-Eum-In* tended to be quiet and not to move at all times, *So-Yang-In* tended to hold something and not always to release it and *So-Eum-In* tended to stay home and not to go out at all times.³⁾ Also, in the study on life habits of students of a primary school, it was identified that both male and female *Tae-Eum-In* had a great amount of activity.¹⁹⁾

3. Biochemical Analysis of Blood

According to the related study, there was no difference in the blood total protein concentration, the serum triglycerides concentration, the albumin concentration, the LDL-cholesterol concentration and the HDL-cholesterol concentration between respective types of *Sa-Sang* constitution.¹⁶⁾ However, it was identified that the blood glucose concentration and the hemoglobin concentration were higher in *Tae-Eum* constitution than in *So-Eum* constitution.¹⁶⁾

In the study on *Sa-Sang* constitution of patients, it was identified that the frequency that hypertension and fatty liver were developed was the highest in *Tae-Eum* constitution, and the serum triglycerides concentration was also the highest in *Tae-Eum* constitution.²⁰⁾ Nevertheless, it was reported that there was no difference in the total cholesterol concentration between respective types of

Sa-Sang constitution. Also, in another study on any change of blood cells in the blood, it was reported that there was no difference in the hemoglobin concentration, the erythrocyte concentration and the leukocyte concentration between respective types of *Sa-Sang* constitution, and the hematocrit concentration was significantly high in *Tae-Eum* constitution.²¹⁾ Also, the total triglycerides concentration, the LDL-cholesterol concentration and the total cholesterol concentration were high in *Tae-Eum* constitution.²¹⁾

4. Dietary Habit

A study similar to this study showed that the frequency of skipping breakfast was higher in the *So-Eum* constitution than in the other types of *Sa-Sang* constitution.¹⁶⁾ Particularly, the pattern of eating meals was shown to be irregular in comparison with other types of *Sa-Sang* constitution and the frequency of the overeating was greater in *So-Eum* than in the other types of *Sa-Sang* constitution, and *Tae-Eum-Ins* ate meals rapidly.

According to one study, *Tae-Eum-Ins* had tendencies to overeat, and they were impetuous so that they ate meals.³⁾ Meanwhile, in another study, it was identified that while *Tae-Eum-Ins* and *So-Yang-Ins* ate meals slowly, the speed of eating a meal by *So-Eum-Ins* was not slow.¹⁵⁾ In other study, it was found that *Tae-Eum-Ins* and *So-Yang-Ins* ate meals more rapidly than *So-Eum-Ins* did.²²⁾ In a related literature, it was reported that in *So-Eum-Ins*, in comparison with the other types of *Sa-Sang* constitution, tended to eat irregularly, to eat smaller amount and to have unbalanced diet. Therefore, they were thought to be exposed to the danger of developing gastritis associated with the irregular dietary habit, causing malnutrition and anemia.¹⁴⁾

In a study on palatability by each type of constitutions, it was found that chicken, pork, egg, apple, garlic, ginger, black pepper, coffee and honey were as harmful to *Tae-Eum-In*, and their actual palatability was low, but there was no significant difference according to the types of constitutions.⁷⁾ Also, for such chicken, red pepper, garlic, ginger, leek, curry, black pepper and honey as harmful to *So-Yang-In*, their actual palatability was found to be higher than those of *So-Eum-In* and *Tae-Eum-In*, but there was no significance. For such hulled millet, flour, barley, mung bean, pork, milk, mackerel, saury, squid, banana, watermelon, melon and draft beer as harmful to *So-Eum-In*, their actual palatability was found to be low. But, it did not show any significant difference, either.

In a study, it was asserted that in connection of

palatability, *Tae-Eum-In* preferred sweet food, *So-Eum-In* preferred cold food, and *So-Yang-In* preferred pungent food.²⁾ But, in another related study, any correlation between a type of constitution and the palatability for the food suitable for it was not observed.¹⁵⁾ It is thought that since the palatability for a specific food might be affected by various parameters, no correlation was shown.

5. Nutrient Intakes

In a study having classified the nutrient intake condition according to the types of *Sa-Sang* constitution, it was identified that in old male population, the caloric intake of *So-Yang-In* was high in comparison with *Tae-Eum-In* and *So-Eum-In* and the protein intake of *Tae-Eum-In* and *So-Eum-In* was low.¹⁷⁾ Particularly, it was reported that each intake of calcium, iron and vitamin A by *Tae-Eum-In* was low in comparison with the other types of constitution. On the other hand, in old female population, each intake of calorie, protein, iron and vitamin A by *Tae-Eum-In* was high in comparison with the other types of constitution. In another related study, it was also analyzed that the caloric intake of *Tae-Eum-In* was high in comparison with *So-Eum-In* and *So-Yang-In*.¹⁵⁾

IMPLICATIONS FOR THE STUDY

In a study, it was reported that though any food unsuitable for anyone's type of constitution was taken when he/she was in good health, any particular side effect did not take place, but it was taken when he/she was ill, a serious side effect might take place.²³⁾ In view of it, the *Sa-Sang* constitution-based medical science has to advance as a customized medical science for creating a great demand on the basis of the dietary habit, palatability for foods and the nutrient intakes depending upon each type of constitution. It is expected that the scientific, objective and accurate diet information depending upon individual's type of constitution will be provided on the basis of the results of this study.

Literature Cited

- 1) Lee JM. *Dong-Eui-Su-Se-Bo-Won*. Sung Li Hwe Company: Seoul, 1967
- 2) Moon HJ, Jung SJ. Nursing approach of four constitutional theory. *J Korea Community Health Nursing* 10:139-154, 1996
- 3) *Sa-Sang Constitution*. Society of Korean Sa-Sang Constitution Association. Jib Mun Dang: Seoul, 1998

- 4) *Sa-Sang Constitution*. Society of Korean Sa-Sang Constitution Association. Jib Mun Dang: Seoul, 1997
- 5) Kim DL. Reliability of questionnaire on Sa-Sang constitutional classification. *J Const Med* 6:89-94, 1994
- 6) Song IB, Kho BH, Lee EJ. Validation of QSCCII. *J Const Med* 7:89-100, 1995
- 7) Song IB. *East Constitutional Medicine*. Sa Sang Company: Seoul, 1996
- 8) Willett WC. *Nutritional epidemiology*. 2nd ed. New York: Oxford University Press, 1998
- 9) Kim J, Kim Y, Ahn YO, Paik HY, Ahn Y, Tokudome Y, Hamajima N, Inoue M, Tajima K. Development of a food frequency questionnaire in Koreans. *Asian Pacific J Clin Nutr* 12:243-250, 2003
- 10) Kim J, Ahn YO, Paik HY, Hamajima N, Inoue M, Tajima K. Calibration of a food frequency questionnaire in Koreans. *Asian Pacific J Clin Nutr* 12:251-256, 2003
- 11) *SPSS professional statistics 11.0*. SPSS Inc. Chicago: IL, 2001
- 12) Tabachnick BG, Fidell LS. *Using multivariate statistics*. 4th ed. New York, NY: Harper Collins College Publishers, 2000
- 13) Kim JW. *Clinical perspectives in alcoholics' personal characteristics*. Master thesis. Kyung Hee University, 1992
- 14) Cho HS, Ji SE, Lee EJ, Hong SC, Koh BH, Kwon GH, Na BH, Cho DU. Validation of Sa-Sang Constitution. *J Const Med* 9:147-173. 1997
- 15) Kim EJ, Choue R, Song IB. The food classification in Sa-Sang constitution and effects of Tae-Eum constitutional diet on the blood biochemical parameters and health status. *Korean J Nutr* 32:827-837, 1999
- 16) Kim YK, Cho MR, Chang R, Choue R. Food habits, nutrient intakes, and disease distribution according to Sa-Sang constitution in the elderly aged over 65 years (II). *Korean J Community Nutr* 7:76-85, 2002
- 17) Sung HJ, Choi SM, Chi SE, Ahn KS. Study of objective diagnostic index of Sa-Sang constitution classification. *Korean Institute of Oriental Medicine*, 2000
- 18) Hong SY, Lee YH. *Principle of Sa-Sang Constitution*. Su Mun Company: Seoul, 1973
- 19) Hong JM, Yoon YS, Choi SM. A study of the difference in body composition, eating habits and dietary intake in three Sa-sang constitution among elementary school children. *Korean J Community Nutr*, 7:67-75, 2002
- 20) Lee SK, Koh BH, Song IB. Analysis of Sa-Sang constitution based on physical examination. *Kyung Hee Medical Journal* 12:349-362, 1996
- 21) Kim KY. Biochemical change in blood among Tae-Eum male students. *Journal of Constitutional Medicine* 1:151-172, 1991
- 22) Kim SM, Song IB. Perspectives in Dong-Eui-Su-Se-Bo-Won. *J Const Med* 12:101-109, 2000
- 23) Ann DH. Sa-Sang constitution and diabetes mellitus. *J Const Med* 6:41-45. 1994