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Bodily differences between Cold- and Heat-prescription groups in Sasang medicine

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ABSTRACT

Background: In Sasang medicine, patients are treated with herbal prescriptions based on Cold-Heat patterns induced by conditions of physiological equilibrium among internal organs, which also induce differences in body circumferences. The objective of the current study was to elucidate the relationship between Cold- and Heat-prescription types and body circumferences.

Methods: Data from suitable subjects (115 males and 222 females) were collected, and the body circumferences were compared according to their Cold- and Heat-prescription grouping. For male subjects with significant body circumference differences between the Cold- and Heat-prescription groups, the body circumference ratios were analyzed by comparing the differences between these groups using ranked analysis of covariance (ANCOVA).

Results: In men, consistent differences were observed in the body circumference measures and ratios between the Cold- and Heat-prescription groups. The Heat-prescription groups showed greater abdominal circumferences, notably demonstrated by a higher rib-to-pelvic circumference ratio in the Tae-Eum (TE) type ($p = 0.041$) and a higher chest-to-hip circumference ratio in the So-Yang (SY) type ($p = 0.087$).

Conclusion: In the SY-type men, the chest circumference was significantly greater in the Heat-prescription group compared to the Cold-prescription group. In the TE-type men, the rib-to-pelvic circumference ratio was significantly higher in the Heat-prescription group than in the Cold-prescription group.

1. Introduction

In East Asian traditional medicine, patients are treated with herbal prescriptions based on pattern identification according to the doctor's observations of the patient's pulse and external appearance, including the face, tongue, voice, body shape, stool, urine, sweating, and skin.[1,2]

For pattern identification, the most important and unique pattern is the Cold–Heat pattern, which reflects not only

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temperature but also metabolic activity.[3] The Cold pattern is related to low metabolism, whereas the Heat pattern is related to high metabolism. Therefore, patients with a Heat pattern show signs and symptoms such as fever, sweating, thirst, yellow urine, and rapid pulse, whereas those of patients with a Cold pattern include cold limbs, little sweating, little thirst, clear urine, and a slow pulse.[4]

Sasang medicine is a unique traditional Korean medicine based on the belief that all patients should be treated in a manner that reflects their unique Sasang types. Although patients may have the same disease, they are prescribed different herbal drugs and foods consistent with their Sasang type.[5]

The Sasang type is defined by conditions of physiological equilibrium among internal organs, which lead to differences of psychological temperaments, face and body shapes, and pathophysiological symptoms.[6,7] Among those factors, body circumferences from head to hips have been observed to differ in association with Sasang types and assessed in many studies.[8]

The Cold–Heat pattern is the decisive factor for the prescription of herbal medicines in Sasang medicine.[9] Donguisusebowon (Longevity and life preservation in Eastern medicine)[5] described the pathologies and herbal medicines of each Sasang type in terms of the Cold–Heat pattern. Therefore, Sasang formulas have been categorized into two groups, with herbal formulas for both the Cold and Heat patterns.[5]

We suggest that body circumferences and the Cold–Heat pattern have a defined relationship through the use of Sasang formulas. However, few studies have assessed the relationship between body circumferences and Cold–Heat patterns. In the current study, we analyzed differences of body circumferences between patients prescribed herbal medicines for both patterns.

2. Methods

2.1. Patients and diagnosis

From 2013 to 2015, a total of 915 patients treated with Sasang medicine at various Korean medicine clinics were evaluated to investigate the relationship between the Sasang medical herbal formulas prescribed and the various phenotypes or symptoms.

A total of 337 patients treated with typical formulas for the Cold or Heat pattern, conforming to the Tae-Eum (TE) or So-Yang (SY) type, were included in this study. Patients prescribed atypical formulas were excluded. Because many So-Eum type formulas in the data were atypical, this type was also excluded. For this reason, only a few So-Eum patients remained in the typical Cold or Heat pattern group.

Diagnosis of the patients' Sasang type was performed by experts using the Sasang Constitutional Analysis Tool.[10] The tool consists of the analysis of the face, body shape, and voice along with information from a questionnaire. When cutoff values are used, the diagnostic accuracy of this tool is 78.7% for males and 59.8% for females.[1] All procedures followed standard protocols.

This study was approved by the Institutional Review Board of the Korea Institute of Oriental Medicine (I-1210/002-002-03).

2.2. Formulas and group

According to Sasang medicine, Cold and Heat patterns exist for each Sasang type. The concepts of Cold–Heat patterns are not so different from those of traditional Chinese medicine. Thus, we hypothesized that the Cold–Heat prescription was related to the Cold–Heat pattern. Accordingly, we divided the patients into Cold- and Heat-prescription groups.

Taeumjowi-tang is the typical formula used for treating the Exterior Cold pattern in the TE type. Yuldahanso-tang and Galgeunhaegi-tang are used to treat the Interior Heat pattern in the TE type. In the SY type, Hyungbangsabaek-san and Hyeongbangjihwang-tang are used for the Exterior Cold pattern, whereas Yanggyeoksanhwa-tang is used for the Interior Heat pattern (Table 1).[5]

Therefore, for the TE type, the patients prescribed Taeumjowi-tang were grouped as the Cold-prescription group, and those prescribed Yuldahanso-tang or Galgeunhaegi-tang were grouped as the Heat-prescription group. For the SY type, the patients prescribed Yanggyeoksanhwa-tang were grouped as the Heat-prescription group, and those prescribed Hyungbangsabaek-san or Hyeongbangjihwang-tang constituted the Cold-prescription group.

2.3. Eight-part body-trunk circumference measurements

A total of eight parts of the body—the forehead, neck, axillae, chest, ribs, waist, pelvis, and hips—were measured for circumference. The axillary, chest, rib, and waist circumferences were used in analysis as trunk circumferences for comparing other body circumferences. According to the theory that each body circumference differs depending on the Sasang type, the eight-part body circumference measurements are used to diagnose the Sasang type.[11,12] The measurements were performed according to the standard protocols provided in Table 2.

The ratios were calculated by dividing the circumferences. For example, RC3_C7 is the ratio of the axillary circumference divided by the pelvic circumference.

2.4. Statistical analysis

An unpaired Student *t* test was used to compare the general characteristics of the patients (Table 3). Ranked analysis of covariance was performed to analyze the circumferences and ratios according to sex, Sasang type, and Cold–Heat prescription group. The SPSS 20 software (IBM Corp., Armonk, NY) was used for statistical analysis.

3. Results

3.1. General characteristics of patients

Table 3 shows the general characteristics of the patients. No significant differences were observed for age, height, weight,

Table 1 – Formula ingredients

Sasang type	Cold–Heat prescription	Name of formula	Ingredient
Tae-Eum	Cold prescription	Taeumjowi-tang	Semen Coicis, Castaneae Semen, Raphani Semen, Fructus Schisandrae, Liriopis seu Ophiopogonis Tuber, Herba Ephedrae, Platycodonis Radix, Acori graminei Rhizoma
	Heat prescription	Yuldahanso-tang	Radix Puerariae, Radix Scutellariae, Ligustici Tenuissimi Rhizoma et Radix, Radix Platycodonis, Raphani Semen, Rhizoma Cimicifugae, Radix Angelicae Dahuricae
		Galgeunhaegi-tang	Radix Puerariae, Radix Scutellariae, Ligustici Tenuissimi Rhizoma et Radix, Rhizoma Cimicifugae, Radix Angelicae Dahuricae, Radix Platycodi
So-Yang	Cold prescription	Hyungbangsabaek-san	Radix Rehmanniae Recens, Poria cocos, Rhizoma Alismatis, Gypsum Fibrosum, Rhizoma Anemarrhenae, Osterici seu Notopterygii Radix et Rhizoma, Aralia Continentalis Radix, Schizonepetae Spica, Radix Saposhnikoviae
	Heat prescription	Hyeongbangjihwang-tang	Radix Rehmanniae Preparat, Corni Fructus, Poria cocos, Rhizoma Alismatis, Semen Plantaginis, Osterici seu Notopterygii Radix et Rhizoma, Aralia Continentalis Radix, Schizonepetae Spica, Radix Saposhnikoviae
		Yanggyeoksanhwa-tang	Radix Rehmanniae, Lonicerae Folium et Caulis, Fructus Forsythiae, Fructus Gardeniae, Herba Menthae, Rhizoma Anemarrhenae, Gypsum Fibrosum, Schizonepetae Spica, Radix Saposhnikoviae

Table 2 – Definition of body circumferences

Part	Circumference	Definition
C1	Forehead circumference	The girth measured horizontally at the level of the midpoint between the two eyebrows (acupuncture point EX-HN3)
C2	Neck circumference	The girth perpendicular to the neck axis and through the lower margin of the thyroid cartilage
C3	Axillary circumference	The girth measured horizontally through the left and right axillae
C4	Chest circumference	The girth measured horizontally through the left and right nipples
C5	Rib circumference	The girth measured horizontally through the left and right prominences of the seventh to eighth costochondral junctions
C6	Waist circumference	The girth measured horizontally through the umbilicus scar
C7	Pelvic circumference	The girth measured horizontally through the left and right anterior superior iliac spines
C8	Hip circumference	The girth measured horizontally through the upper margin of the pubis

Table 3 – General characteristics of patients

	TE type			SY type		
	Cold-prescription group	Heat-prescription group	*p*	Cold-prescription group	Heat-prescription group	*p*
Males						
N	11	48		27	29	
Age (y)	47.6 ± 14.5	48.7 ± 16.3	0.846	43.2 ± 13.3	50.0 ± 14.8	0.076
Height (cm)	173.2 ± 7.8	171.1 ± 6.9	0.383	172.0 ± 6.0	171.1 ± 6.6	0.617
Weight (kg)	76.6 ± 6.3	75.6 ± 9.8	0.742	71.5 ± 8.1	70.7 ± 8.8	0.719
BMI (kg/m^2)	25.6 ± 2.4	25.8 ± 2.6	0.847	24.2 ± 2.2	24.1 ± 2.6	0.952
Females						
N	21	70		97	34	
Age (y)	45.7 ± 14.5	46.5 ± 15.1	0.867	43.2 ± 14.8	52.5 ± 15.6	0.002†
Height (cm)	159.5 ± 5.9	159.7 ± 5.1	0.871	158.8 ± 5.4	157.2 ± 5.3	0.118
Weight (kg)	65.2 ± 7.7	65.2 ± 8.2	0.984	54.5 ± 7.5	55.5 ± 6.5	0.496
BMI (kg/m^2)	25.6 ± 2.8	25.6 ± 3.2	0.933	21.6 ± 3.0	22.5 ± 2.4	0.135

Data are presented as the means ± standard deviation. The statistical data analysis was performed using Student *t* test.
† $p < 0.01$.
BMI, body mass index; SY, So-Yang; TE, Tae-Eum.

Table 4 – Body circumferences according to Cold- and Heat-prescription groups for men

Circumference (cm)	TE type			SY type		
	Cold-prescription group	Heat-prescription group	*p*	Cold-prescription group	Heat-prescription group	*p*
C1	56.65 ± 1.74	57.64 ± 1.55	0.045*	56.16 ± 1.59	55.57 ± 1.42	0.226
C2	39.65 ± 2.33	39.11 ± 1.95	0.374	38.11 ± 1.65	37.18 ± 2.75	0.129
C3	99.91 ± 4.16	98.94 ± 5.72	0.267	96.76 ± 4.10	98.07 ± 5.50	0.082
C4	98.79 ± 4.01	98.59 ± 6.72	0.676	95.06 ± 4.82	97.20 ± 5.18	0.036*
C5	92.11 ± 5.41	92.81 ± 5.46	0.915	88.16 ± 4.96	90.42 ± 5.05	0.119
C6	92.85 ± 5.47	93.03 ± 8.38	0.958	86.77 ± 5.78	89.02 ± 4.71	0.084
C7	97.90 ± 5.38	95.44 ± 6.35	0.078	92.51 ± 4.59	93.47 ± 4.61	0.543
C8	100.66 ± 4.85	98.76 ± 5.15	0.148	96.51 ± 4.05	96.51 ± 3.49	0.103

Data are presented as the means ± standard deviation. Ranked ANCOVA was used to compare group differences. The *p* values were adjusted by covariates (age and BMI).

* $p < 0.05$.

ANCOVA, analysis of covariance; BMI, body mass index; C1, forehead circumference; C2, neck circumference; C3, axillary circumference; C4, chest circumference; C5, rib circumference; C6, waist circumference; C7, pelvic circumference; C8, hip circumference; SY, So-Yang; TE, Tae-Eum.

and body mass index (BMI) among the TE-type patients. For the SY type, although differences were observed for age in men and for height and BMI in women, these differences were not significant. For women with the SY type, age significantly differed ($p = 0.002$).

3.2. *Comparison of body circumferences*

Table 4 shows the differences in male body circumferences according to the Cold–Heat prescription group. The data were analyzed after adjusting for age and BMI, notably regarding the age of the SY-type females ($p = 0.002$) because these factors may affect body circumferences.

For the SY-type men, only the chest circumference was significantly greater in the Heat-prescription group compared with the Cold-prescription group ($p = 0.036$). Moreover, other trunk circumferences such as the axillary, rib, and waist circumferences also tended to be greater in the Heat-prescription group than in the Cold-prescription group, indicating that in men, the upper body of patients in the Heat-prescription group was larger than that in the SY-type Cold-prescription group.

For the TE-type men, the pelvic and hip circumferences of the Heat-prescription group tended to be smaller than those of the Cold-prescription group (Table 4; $p = 0.078$ and 0.148, respectively), indicating that the lower body circumference of patients in the Heat-prescription group was smaller compared with that in the Cold-prescription group.

No significant differences were observed among the women (Table 5), with only the hip circumference of the Heat-prescription group tending to be smaller than that of the Cold-prescription group ($p = 0.064$).

3.3. *Comparison of ratios of trunk circumferences to pelvic, hip, and neck circumferences*

Because different tendencies were observed in the trunk and hip circumferences between the Heat- and Cold-prescription groups, we additionally analyzed the ratios of trunk circumferences to pelvic, hip, and neck circumferences. Because no significant differences were observed for the circumferences in women, this analysis was performed only for men.

Table 6, which compares the ratios obtained by dividing the pelvic or hip circumferences, shows that the ratio of the rib-to-pelvic circumference was significantly greater in the Heat-prescription group than in the Cold-prescription group for the TE type ($p = 0.041$). Additionally, other ratios of the

Table 5 – Body circumferences according to Cold- and Heat-prescription groups for women

Circumference	TE type			SY type		
	Cold-prescription group	Heat-prescription group	*p*	Cold-prescription group	Heat-prescription group	*p*
C1	55.07 ± 2.08	55.12 ± 1.78	0.757	53.47 ± 1.20	53.39 ± 1.27	0.624
C2	34.49 ± 2.26	34.45 ± 2.49	0.371	32.64 ± 2.93	32.92 ± 1.94	0.634
C3	91.01 ± 5.10	92.36 ± 5.88	0.266	85.39 ± 6.04	87.13 ± 4.95	0.888
C4	95.72 ± 6.66	96.50 ± 6.74	0.327	87.71 ± 7.44	89.58 ± 4.91	0.807
C5	83.46 ± 6.96	84.00 ± 7.43	0.757	75.65 ± 7.49	77.74 ± 6.12	0.843
C6	87.97 ± 6.69	87.14 ± 8.21	0.290	77.73 ± 8.43	81.09 ± 7.80	0.941
C7	94.09 ± 7.57	94.97 ± 6.56	0.467	87.59 ± 6.27	88.56 ± 6.12	0.289
C8	99.87 ± 7.27	98.07 ± 6.52	0.064	92.59 ± 5.72	93.14 ± 6.13	0.297

Data are presented as the means ± standard deviation. Ranked ANCOVA was used to compare group differences. The *p* values were adjusted by covariates (age and BMI).

ANCOVA, analysis of covariance; BMI, body mass index; C1, forehead circumference; C2, neck circumference; C3, axillary circumference; C4, chest circumference; C5, rib circumference; C6, waist circumference; C7, pelvic circumference; C8, hip circumference; SY, So-Yang; TE, Tae-Eum.

Table 6 – Ratio of body circumferences divided by pelvic or hip circumference in males

Ratio	TE type			SY type		
	Cold-prescription group	Heat-prescription group	*p*	Cold-prescription group	Heat-prescription group	*p*
RC3_C7	1.022 ± 0.042	1.038 ± 0.048	0.190	1.048 ± 0.054	1.051 ± 0.062	0.520
RC4_C7	1.010 ± 0.031	1.034 ± 0.046	0.091	1.028 ± 0.046	1.041 ± 0.054	0.277
RC5_C7	0.941 ± 0.041	0.974 ± 0.049	0.041*	0.954 ± 0.047	0.968 ± 0.044	0.232
RC6_C7	0.949 ± 0.027	0.975 ± 0.058	0.086	0.938 ± 0.043	0.953 ± 0.040	0.213
RC3_C8	0.993 ± 0.028	1.002 ± 0.037	0.238	1.003 ± 0.042	1.016 ± 0.047	0.388
RC4_C8	0.982 ± 0.280	0.999 ± 0.049	0.190	0.985 ± 0.041	1.007 ± 0.037	0.087
RC5_C8	0.916 ± 0.052	0.941 ± 0.048	0.121	0.914 ± 0.048	0.937 ± 0.044	0.208
RC6_C8	0.923 ± 0.037	0.942 ± 0.069	0.109	0.899 ± 0.049	0.923 ± 0.039	0.131

Data are presented as the means ± standard deviation. Ranked ANCOVA was used to compare group differences. The *p* values were adjusted by covariates (age, BMI).

* $p < 0.05$.

ANCOVA, analysis of covariance; BMI, body mass index; C1, forehead circumference; C2, neck circumference; C3, axillary circumference; C4, chest circumference; C5, rib circumference; C6, waist circumference; C7, pelvic circumference; C8, hip circumference; Ra_b, a/b; SY, So-Yang; TE, Tae-Eum.

trunk circumferences divided by the pelvic or hip circumferences were higher in the Heat-prescription group than in the Cold-prescription group.

For the SY type, the ratios of the trunk circumferences divided by the pelvic or hip circumference also tended to be greater in the Heat-prescription group than in the Cold-prescription group, although these values did not reach significance (Table 6). However, significant differences were observed in the ratio obtained by dividing the trunk circumference by the neck circumference for the SY type (Table 7), indicating that the Heat-prescription group of the SY type showed a larger trunk in relation to the neck circumference compared with the Cold-prescription group (Table 7).

No significant differences were observed in the ratios of the trunk circumference divided by the neck circumference between the Cold- and Heat-prescription groups for the TE type.

4. Discussion

The current study reveals four major new findings. First, the body circumference differences between the Cold- and Heat-pattern Sasang types were observed only in men. The hypothesized reason for this finding is that muscle development, which leads to body-size changes that occur alongside a Heat- or Cold-pattern condition, is more vigorous in men than in women.

Second, based on the analysis of standard body circumferences, the Heat pattern was associated with greater trunk girth in the SY type. Alternatively, because the TE type is known to be associated with significantly higher BMI and Ponderal Index than other Sasang types, the body circumference changes in the TE type might not have been large enough to be detected.

Third, compared to the Cold-prescription group, the Heat-prescription group demonstrated a significantly greater trunk/neck circumference ratio in the SY type, whereas in the TE type, the trunk/pelvic circumference ratio was greater. These results indicate that the Heat pattern is associated with a trunk that is proportionally larger compared with the neck or hip.

Fourth, regarding the SY type, compared with the Cold-prescription group, the Heat-prescription group had significantly larger chest circumference, which is the body part described as the most developed in the SY type by Lee and Choi.[5] For the TE type in contrast, compared with the Cold-prescription group, the Heat-prescription group had a

Table 7 – Ratio of body circumferences divided by neck circumferences in males

Ratio	TE type			SY type		
	Cold-prescription group	Heat-prescription group	*p*	Cold-prescription group	Heat-prescription group	*p*
RC3_C2	2.525 ± 0.146	2.532 ± 0.132	0.940	2.541 ± 0.097	2.646 ± 0.175	0.014*
RC4_C2	2.496 ± 0.112	2.523 ± 0.149	0.881	2.495 ± 0.101	2.623 ± 0.165	0.002†
RC5_C2	2.324 ± 0.079	2.375 ± 0.129	0.433	2.314 ± 0.106	2.440 ± 0.165	0.002†
RC6_C2	2.343 ± 0.083	2.380 ± 0.200	0.648	2.277 ± 0.117	2.404 ± 0.183	0.006†

Data are presented as the means ± standard deviation. Ranked ANCOVA was used to compare group differences. The *p* values were adjusted by covariates (age, BMI).

* $p < 0.05$. † $p < 0.01$.

ANCOVA, analysis of covariance; BMI, body mass index; C1, forehead circumference; C2, neck circumference; C3, axillary circumference; C4, chest circumference; C5, rib circumference; C6, waist circumference; C7, pelvic circumference; C8, hip circumference; Ra_b, a/b; SY, So-Yang; TE, Tae-Eum.

significantly greater rib/pelvic circumference ratio, and the rib circumference girth was closer to that of the waist than to the chest circumference. The waist is the most developed part for the TE type according to Lee Je-Ma.[5] Thus, we suggest that the Heat pattern leads to greater bodily changes in the most developed body part for each Sasang type.

Considering that more Heat is produced when internal organs are more activated, we hypothesize that overstimulation of internal organs evoke the Heat pattern and a trunk that is proportionally larger compared with the neck or hip. Moreover, according to Lee Je-Ma's premise that the SY type has a strong spleen and developed chest,[5] we hypothesize that overactivation of the spleen in the SY type leads to the Heat pattern and a larger chest. Similarly, according to Lee Je-Ma's premise that the TE type has a strong liver and developed waist, we hypothesize that overactivation of the liver in the TE type leads to the Heat pattern and a greater rib circumference.

Historically, an association has been observed between body circumferences and disease susceptibility.[13,14] Recently, various body indices, such as waist circumference, waist/hip ratio, and neck circumference, have been studied as risk factors for cardiometabolic diseases.[15,16] Based on the results of the current study, we suggest that body circumference reflects the functional intensity of the internal organs, which may lead to differences in disease susceptibility. Although this hypothesis has not yet been supported by physiological evidence from conventional medicine, our study provides the preliminary evidence. Thus, it may be worthwhile to study these hypotheses based on Sasang medicine.

Because the recognition of an individual's Sasang type is important for the prediction and treatment of diseases, which are unique to each constitution, the relationship between the body circumferences and pattern identification is important for the accurate prescription of herbal medicines. Despite many limitations, our study suggests a new research direction and stimulates further study on the relationship between body shape and the function of internal organs.

Conflicts of interest

The authors declare no conflicts of interest.

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