Original Article

Analysis of Pathogenic Factors in the Menopausal Symptoms of Middle-aged Women in Relation to Sasang Constitutional Type

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Background: Pattern identification is a unique diagnostic method of traditional Oriental medicine that has recently been the target of questionnaire-based research. Sasang (four-types) constitutional medicine (SCM) is a practice in traditional Korean medicine that seeks to promote objectivity in diagnostics. This paper attempts to illuminate the relationship between constitutions and the pathogenic factors of pattern identification through questionnaires completed by menopausal women about their symptoms.

Methods: From March to October 2012, we examined 291 women from the general population, with ages ranging from 40 to 60 years, applying the Kupperman index, the Menopause-Specific Quality of Life Questionnaire (MENQOL), pattern identification based on the Diagnosis System of Oriental Medicine (DSOM), and SCM. We then analyzed the relationship between constitutional type and pathogenic factors.

Results: No significant differences were found in the scores of either the Kupperman index or MENQOL questionnaire in relation to constitutional type. However, in a statistical analysis correlating the DSOM pathogenic factor scores (PFS) with the scores of the Kupperman index and MENQOL vasomotor subscale, heat showed a significant positive correlation with SoYang type (SY) and TaeEum type (TE), but not SoEum type (SE), while insufficiency of yin and insufficiency of yang, as well as blood deficiency, showed a significant positive correlation with the TE and SE types.

Conclusion: The pathogenic factors in the menopausal symptoms of middle-aged women, specifically the prominent menopausal symptom of facial flushing, differed significantly according to constitutional type.

Key Words : pattern identification, menopausal symptoms, facial flushing, Sasang constitutional medicine, DSOM (Diagnosis System of Oriental Medicine)

Introduction

"Climacteric" refers to a certain period in a woman's mid-life when menstruation stops permanently and reproductive ability ends. The term encompasses biological as well as psychosocial and cultural implications. During the years before menopause, mental and physical problems may arise as female hormones begin to decrease. This condition is termed climacteric syndrome.

In Oriental medicine, a basic characterization of climacteric phenomena can be derived from the concept of "Neijing." A number of symptoms such as kidney qi deficiency, reproductive substance (天癸)

exhaustion, weakening of the Thoroughfare and Conception vessels (衝任脈), gradual loss of reproductive function, and gradual decline in organ function are reported in premenopausal and postmenopausal women. In the presence of these symptoms, the body's Yin and Yang equilibrium becomes disrupted, which leads to disease. Therefore, it is often assumed that the etiology of menopause involves kidney deficiency (腎虛).[1] However, as the liver and Thoroughfare vessel govern and direct "the sea of blood" while the Conception vessel directs all of the Yin channels,[2] menopause can rather be considered to result from a lack of Yin-blood.[3-4]

Oriental medicine practitioner Lee Je-Ma postulated the theory of Sasang constitutional types in his 1894 book called *Dongeuisusebowon* (東醫壽世保元), or *Longevity & Life Preservation in Oriental Medicine*. The theoretical foundation of Sasang (four-type) constitutional medicine (SCM, 四象醫學) is that humans can be divided into four constitutional types--TaeYang type (TY, Greater Yang), SoYang type (SY, Lesser Yang), TaeEum type (TE, Greater Yin) and SoEum type (SE, Lesser Yin)--according to various factors like the size of the lungs, liver, spleen, and kidneys.[5-6] Lee Je-Ma believed that humans are born in a physiological state of imbalance. If the physiological imbalances progressively accumulate, this eventually causes a pathological state. He also thought that an increase in these imbalances triggers further complications, with particular tendencies associated with different Sasang constitutional types.[5] Therefore, we hypothesized that the pathogenesis and pathology of facial flushing associated with menopause may differ between the Sasang constitutional types.

Pattern identification is a unique diagnostic method of traditional Oriental medicine that has recently been the target of questionnaire-based research studies.[7-10] SCM is a practice of traditional Korean medicine that seeks to promote objectivity in diagnostics.[10-15] Although their diagnostic methods are different, SCM and pattern identification share

similar principles and backgrounds. However, little research has been done on the relationship between them. The study reported here attempts to illuminate the relationship between Sasang constitutional type and the pathogenic factors of pattern identification through questionnaires for menopausal women.

Methods

We examined middle-aged women to determine whether or not the pathogenesis and pathology of menopausal symptoms varied significantly according to constitutional type. The study, approved by the institutional review board of our hospital (no. 2011-06), was conducted from March to October 2012. Applying acceptance criteria for clinical studies that entail a confidence level of 95% and a significance level of 5%, with a margin of error of 5.75%, the minimum required number of test subjects was 291. The participants selected were 291 women in the perimenopausal stage, aged 40 to 60 years. The population distribution according to constitutional type was as follows: SY (n = 53), TE (n = 131), SE (n = 103), and TY (n = 4). The number of TY women, however, was so small that their inclusion could have adversely affected the reliability of the statistical analysis. Thus, women categorized as TY were excluded, leaving a final total of 287 participants in the analysis, with a 95% confidence level (significance level of 5%) and a margin of error of 5.79%.

The participants were evaluated using the Kupperman index, Menopause-Specific Quality of Life Questionnaire (MENQOL), pattern identification based on the Diagnosis System of Oriental Medicine (DSOM), and SCM.

1. Inclusion/Exclusion Criteria

　1) Selection criteria
　・ Women with ages ranging from 40 to 60 years
　・ Healthy participants without any other illnesses

・ Women who agreed to participate after receiving a full explanation of the present study

2) Exclusion criteria
・ Women who had undergone a hysterectomy due to malignant disease or due to chemotherapy during the postmenopausal period
・ Women with a medical history of cancer during the previous 5 years
・ Women currently taking anticoagulants
・ Women with valvular heart disease
・ Women with ischemic cardiovascular disease or a past medical history of cardiovascular disease
・ Women with active liver or gallbladder disease
・ Women with hypothyroidism
・ Women with hyperthyroidism
・ Women with psychiatric disorders
・ Women taking antidepressants
・ Women deemed incapable of completing the forms related to the research
・ Women with other serious diseases that could affect the symptoms relevant to the study.

2. Diagnosis

・ To identify the characteristics of the test subjects from the viewpoint of Oriental medicine, we categorized the participants according to their Sasang constitutional types and performed pattern identification.
  - A specialist in SCM conducted constitutional diagnosis using responses from the Constitutional Diagnosis Questionnaire[16] in combination with photos of the participants.
  - For pattern identification, the Diagnosis System of Oriental Medicine (hereafter DSOM)[17-18] was used.
・ For the survey of menopausal symptoms, the Kupperman index[19] and MENQOL[20] were used. From the MENQOL, only the vasomotor subscale was used, as it is associated with climacteric hot flushes.

3. Diagnosis System of Oriental Medicine: DSOM

The DSOM is an online survey diagnosis system. Oriental medicine generally uses pattern identification for diagnosis according to qi-blood, yin-yang, fluid-humor, visceral organs, and cold-heat-dryness-dampness, which are the most fundamental units of the Oriental diagnostic system. On the basis of those patterns, 16 pathogenic factors (病機) were selected from the DSOM, and a questionnaire was produced pertaining to the primary and secondary symptoms of each pathogenic factor.[21]

The pathogenic factors selected from the DSOM included qi deficiency (氣虛), blood deficiency (血虛), qi stagnation (氣滯), blood stasis (血瘀), yin deficiency (陰虛), yang deficiency (陽虛), cold (寒), heat (熱), dampness (濕), dryness (燥), liver, heart, spleen, kidney (腎), phlegm (痰), and lung (肺) (22).

The pathogenic factor scores (PFS, 病機點數) were derived from questionnaire responses on a 5-point Likert scale collapsed into a 3-point scale, as follows: ⑤ Strongly agree (100 points); ③ Average (50 points); ① Strongly disagree (0 points).

The standard of reliability was based on the pathogenic factor index (病機指標), a measure of how many primary symptoms were reported by a given participant for each pathogenic factor. In this study, analysis was limited to pathogenic factors demonstrating reliability.[21,23,24]

4. Statistical methods

Statistical analysis was performed using the statistical package SAS 9.1. The chi-square test was used for the homogeneity test to determine the ratio of different constitutional types in the test group. Furthermore, a stepwise regression analysis was conducted to determine correlations between DSOM

pathogenic factors and the scores of the Kupperman index and MENQOL.

Results

1. Basic characteristics

The overall average age of the participants was 52.76 years (4.43 error). The number and average age for each Sasang constitutional type were as follows: SY (n = 53), 52.32 years; TE (n = 131), 52.71 years; and SE (n = 103), 53.04 years. These demographic characteristics are shown in Table 1.

Among the 287 test participants, 172 (59.93%) had not experienced menopause and 115 (40.07%) had entered menopause. The menopausal status of the participants according to constitutional type is shown below in Table 2.

2. Menopausal index analysis

The participants' overall mean scores from the Kupperman index and MENQOL and the mean scores for each Sasang constitutional type are shown in Table 3.

No significant differences relative to constitutional type were found in the average scores for the Kupperman index and the MENQOL.

3. Correlations between the DSOM PFS and the Kupperman index

We examined the relationship between the Kupperman index scores and the DSOM PFS to investigate whether or not the pathogenesis and pathology of menopausal symptoms varied according to constitutional type.

Because a significance level of 0.15 is typically used in stepwise regression analysis, we considered a p-value of <0.15 for each regression coefficient as significant.[25]

The findings on correlations between the DSOM PFS and the Kupperman index according to constitutional type are shown in Table 4.

4. Correlations between the DSOM PFS and MENQOL vasomotor scores

The findings on the correlations between the DSOM PFS and MENQOL vasomotor scores according to constitutional type are shown in Table 5.

Table 6 shows the data set for identifying correlations between the DSOM PFS and the Kupperman index and MENQOL vasomotor scores according to constitutional type.

Table 1. Demographic Characteristics Number (%)

Number (%) / Age	SY	TE	SE	Total
40-45	5 (9.43)	12 (9.16)	3 (2.91)	20 (6.97)
46-50	15 (28.3)	30 (22.9)	26 (25.2)	71 (24.74)
51-55	16 (30.2)	50 (38.2)	41 (39.8)	107 (37.28)
56-60	17 (32.1)	39 (29.8)	33 (32)	89 (31.01)
Total	53	131	103	287
Average	52.32	52.71	53.04	52.76

Table 2. Menopause Status according to Constitutional Type

Number (%) / Menopause status	SY	TE	SE	Total
Not experiencing	30 (56.60)	72 (54.96)	70 (67.96)	172 (59.93)
Experiencing	23 (43.40)	59 (45.04)	33 (32.04)	115 (40.07)
Total	53	131	103	287

Table 3. Average Scores for Kupperman's Index and MENQOL by Constitutional Type

| | | Kupperman index | MENQOL | | | |
			Vaso-motor	Psycho-social	Physical	Sexual
Overall (n = 287)	Mean	14.446	2.554	7.456	18.481	3.411
	Standard deviation	11.158	3.610	7.560	16.479	4.189
SY (n = 53)	Mean	13.7	2.62	6.59	17	2.93
	Standard deviation	10.095	3.46	7.933	14.502	4.349
TE (n = 131)	Mean	15.05	2.6	7.65	19.31	3.94
	Standard deviation	11.9	3.42	7.47	18.1	4.42
SE (n = 103)	Mean	14.068	2.456	7.66	18.184	2.99
	Standard deviation	10.793	3.938	7.519	15.385	3.735
F value		0.38	0.06	0.43	0.4	1.93
Pr > F		0.6864	0.9427	0.6507	0.6734	0.147

Table 4. Correlations between DSOM PFS and Kupperman Index by Constitutional Type

| | | Parameter estimate | Standard error | F test | |
				F value	Pr > F
SY (n = 53)	QS	-0.14227	0.06277	5.14	0.028[*]
	Da	0.11245	0.03308	11.56	0.0014[*]
	Hr	0.23	0.05092	20.4	<.0001[**]
	Sp	0.11801	0.04884	5.84	0.0195[*]
	BD	0.05876	0.03137	3.51	0.0634
TE (n = 131)	YaI	0.07946	0.02947	7.27	0.008[*]
	He	0.03655	0.02183	2.80	0.0966
	Hr	0.09196	0.0378	5.92	0.0164
	Sp	0.07716	0.02526	9.33	0.0028[*]
	BD	0.06402	0.02786	5.28	0.0237[*]
SE (n = 103)	QS	0.06777	0.02843	5.68	0.019[*]
	YiI	0.15546	0.03651	18.13	<.0001[**]
	Da	0.04958	0.02223	4.98	0.028[*]

BD: blood deficiency, QS: qi stagnation, Yil: yin insufficiency , Yal: Yang insufficiency, He: heat, Da: dampness, Li: liver, Hr: heart, Sp: spleen
* p<0.05, ** P<0.01

Discussion

To investigate differences in the pathogenesis and pathology of menopausal symptoms according to constitutional type, the Kupperman index and the MENQOL were used to determine the degree of severity of the participants' menopausal symptoms. In particular, the Kupperman index is a scale for evaluating menopause-related symptoms used widely in many studies. We also used the MENQOL, a self-administered questionnaire consisting of 29 questions divided into four subscales: vasomotor (items 0103), psychosocial (items 0410), physical (items 1126), and sexual (items 2729). Because this study focused on facial flushing, the only component of the MENQOL used in the statistical analysis was the vasomotor subscale.

No significant differences by constitutional type were found in the scores of either the Kupperman index or the MENQOL, suggesting that the severity

Table 5. Correlations between DSOM PFS and MENQOL Vasomotor Score by Constitutional Type

		Parameter estimate	Standard error	F test	
				F value	Pr > F
SY (n = 53)	He	0.02897	0.01383	4.39	0.0414*
	Hr	0.03193	0.01446	4.88	0.0319*
	Ph	0.03472	0.02075	2.80	0.1007
TE (n = 131)	YiI	0.02361	0.01250	3.57	0.0612
	YaI	0.04687	0.0115	16.61	<.0001**
	He	0.01811	0.00824	4.83	0.0299*
	Da	-0.02401	0.00811	8.76	0.0037*
SE (n = 103)	YiI	0.08527	0.02013	17.94	<.0001**
	YaI	0.03488	0.01424	6	0.0161*
	Li	-0.04091	0.01489	7.55	0.0072*
	Hr	0.0266	0.01072	6.16	0.0148*
	Sp	-0.02036	0.01157	3.10	0.0816

YiI: yin insufficiency, YaI: Yang insufficiency, He: heat, Da: dampness, Li: liver, Hr: heart, Sp: spleen, Ph: phlegm
*p < 0.05, ** p < 0.01

and types of symptoms experienced by women of different constitutional types display no clear distinctions (Table 3).

In addition to the symptom of facial flushing that is the focus of this study, the Kupperman index also includes questions about other physical and psychological symptoms. The vasomotor subscale of the MENQOL, meanwhile, is limited to questions about hot flashes or flushes, sweating, and night sweats, such as experiencing a hot feeling on the face or sweating at night.[27] Such symptoms are thought to be related to yin insufficiency.

The results from the correlation analysis of the Kupperman index and the DSOM PFS found the following significant positive correlations for different constitutional types: dampness, liver, and spleen in SY women; blood deficiency, yang insufficiency, heat, liver, and heart in TE women; and blood deficiency, qi stagnation, yin insufficiency, and dampness in SE women. Meanwhile, a significant negative correlation was found for the DSOM PFS of qi stagnation in SY women (Table 6).

In the results from the vasomotor subscale of the MENQOL questionnaire, the following significant positive correlations were found between DSOM PFS and different constitutional types: heat, heart, and phlegm in SY women; yin insufficiency, yang insufficiency, and heat in TE women; and yin insufficiency, yang insufficiency, and dampness in SE women. Meanwhile, the DSOM PFS showing

Table 6. Correlations between DSOM PFS and Scores of the Kupperman Index and MENQOL Vasomotor Subscale by Constitutional Type

		Positive correlation	Negative correlation
SY (n = 53)	Kupperman index	Da, Li, Sp	QS
	MENQOL vasomotor	He, Hr, Ph	
TE (n = 131)	Kupperman index	BD, YaI, He, Li, Hr	
	MENQOL vasomotor	YiI, YaI, He	Da
SE (n = 103)	Kupperman index	BD, QS, YiI, Da	
	MENQOL vasomotor	YiI, YaI, Hr	Li, Sp

QD: qi deficiency, BD: blood deficiency, QS: qi stagnation, YiI: yin insufficiency, YaI: Yang insufficiency, He: heat, Da: dampness, Dr: dryness, Li: liver, Hr: heart, Sp: spleen, Ki: kidney, Ph: phlegm

significant negative correlations were dampness in TE women and liver and spleen in SE women (Table 6).

Thus, in the correlation analysis between the DSOM PFS and the MENQOL's vasomotor subscale, a measure largely associated with the typical menopausal symptom of hot flashes or facial flushing, we were able to identify some statistical differences in relation to different constitutional types.

Heat, the DSOM PFS believed to have the strongest relationship with menopausal hot flushes, showed a significant positive correlation in SY and TE, but not in SE. Yin insufficiency and yang insufficiency, which are considered pathogenic factors resulting from weakness or lethargy during the menopausal period, showed significant positive correlations in TE and SE, but not in SY. The implication is that hot flashes and facial flushing are caused chiefly by heat in SY and by heat and yin insufficiency in TE, while in SE, the primary cause is not heat but rather weakness or lethargy.

According to SCM theory, the SY type can be characterized by interior febrile diseases (裏熱證) with symptoms like tidal fever, hot flashes and facial flushing, and night sweats. The TE type can also be characterized by interior febrile diseases such as dry-constipation pattern (燥澁煩肺證), liver dry heat pattern (肝燥熱證), and dry heat pattern with Yin-blood consumption pattern (陰血耗渴證). However, the SE type is typically associated with interior cold diseases, and no real heat-induced diseases.[5-6,28] The results of this study are in concordance with the classic of SCM, *Dongeuisusebowon*.[29]

The results from the Kupperman index, on the other hand, are more complicated. This can be considered a likely result of the broader scope of symptoms included in the questionnaire. As in the results from the MENQOL questionnaire, the DSOM PFS of the TE and SE types indicated such weaknesses as blood deficiency, yin insufficiency, and yang insufficiency, while those of the SY type did not. Heat was significant only in the TE type.

Heart, which is a DSOM factor associated with stress, had a positive correlation with the TE and SY types, as did qi stagnation in the SE type. A high spleen-related PFS in the SY type was thought to relate to nervous stomach disorders.

The chief causes of facial flushing generally include kidney deficiency, deficiency fire, yang deficiency, and dual deficiency of yin and yang.[1] However, in this study, we were able to identify some variance within this framework according to the characteristics of the different constitutional types. That is, the variance can be said to result from different physiological imbalances associated with the Sasang constitutions, as described below.[30]

The SY type has weak kidney function and strong spleen function, which can cause moisture metabolic disturbance.

In the TE type, the lungs are hypoactive, which may lead to peripheral blood circulation disorders from overall metabolic degradation, while the liver is hyperactive, resulting in a yin-blood consumption pattern. As such, the TE type can be characterized by a state of weak consumption and strong storage of qi and body fluids.[30]

The condition of the SE type is marked by weak raw material intake and strong waste discharge due to a congenitally hypoactive spleen group and hyperactive kidney group.[30] The SE type can be characterized by deficiency of qi and blood, and is prone to consumptive disease. Dampness stagnates easily due to insufficient raising of middle qi. The SE type may be timid and very meticulous, and their qi stagnates easily.

The participants in this study were women in the age range of 40 to 60 years who had not sought treatment for facial flushing or hot flushes. It should be noted that these findings may not apply to women experiencing such symptoms. In the future, more research is needed to confirm that facial flushing associated with menopause may vary among the four different constitutional types.

Originally, the goal of the study reported here was to compare the health condition of pre- and post-menopausal women from the viewpoint of Oriental medicine. However, we were unable to recruit two groups with the appropriate characteristics.

In Western medicine, the explanation for the occurrence of menopause in women around age 50 is ovarian aging. But in Oriental medicine, it is explained by the aging of the Yangming meridian and the Thoroughfare and Conception vessels (衝任脈).

The main cause of one of the typical menopause symptoms, facial flushing, is blood and yin deficiency, two pathogenic factors which tend to be common in middle-aged women. In principle, the greater a woman's deficiency of blood and yin, the more severe facial flushing she will experience.

This was the rationale for our investigation of the severity of menopausal symptoms in middle-aged women according to their health condition. The results of the study turned out to be consistent with the theories of TCM.

Limitations of this study's results:

In this study, we investigated the relationship between facial flushing and the health condition of middle-aged women, as well as correlations with different Sasang constitutions. However, a limitation of the study is that facial flushing was not limited to menopausal syndromes. It also occurred as a particular health condition of middle-aged women undergoing aging of the Thoroughfare and Conception vessels (衝任脈), and thus likely to have blood and/or yin deficiency.

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