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So-Eum Type as an Independent Risk Factor for Irritable Bowel Syndrome: A Population-Based Study in Korea

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Abstract

Objectives: It has been hypothesized that Sasang constitutional types (SCTs) have a specific hypoactive organ, which can account for vulnerability to related diseases or symptoms. This study examined the relationship between SCTs and irritable bowel syndrome (IBS).
Design: Cross-sectional study in a population-based cohort study in Korea.
Participants: 1362 individuals (705 men and 657 women) who participated in the Korean Genome and Epidemiology Study.
Outcome measures: The participants were classified into SCTs by the integrated diagnostic model and asked about symptoms related to IBS using the Rome II criteria.
Results: The prevalence of IBS differed significantly among the SCTs, with 33 (18.3%) of the So-eum (SE) type, 74 (9.9%) of the Tae-eum (TE) type, and 57 (13.2%) of the So-yang (SY) type having IBS. Even after adjustment for possible confounders, the SE type for both sexes continued to show 1.82-fold (95% confidence interval [CI], 1.05–3.16) excess odds of having IBS. Men with SE type had a 2.97 times (95% CI, 1.34–6.58) and a 2.50 times (95% CI, 1.15–5.47) significantly higher odds of having IBS than the TE and SY types, respectively. In analysis for the joint effect of SCT and psychological stress, the multivariate odds ratio of IBS was 3.21 (95% CI, 1.33–7.75) for the SE type and Psychological Well-Being Index-Short Form (PWI-SF) score (<27), and 5.83 (95% CI, 1.80–18.88) for the SE type and PWI-SF (≥ 27) compared with the TE type and PWI-SF score (<27).
Conclusions: The SE type of SCT is an independent risk factor for IBS. The findings support the hypothesis that persons with SE type are vulnerable to gastrointestinal diseases.

Introduction

Sasang constitutional medicine (SCM) is a traditional alternative and complementary medicine in Korea introduced by Korean physician Jema Lee (AD 1837–1900). In SCM theory, humans are classified into four distinct Sasang constitutional types (SCTs)—Tae-yang (TY) type, Tae-eum (TE) type, So-yang (SY) type, and So-eum (SE) type—and individuals who belong to each constitution have differing drug responses, disease susceptibility, and different organ activity.[1] The ultimate goals of SCM are to provide individualized therapy to patients in order to minimize the risk of adverse outcome and to maximize treatment efficacy.[1]

Studies have sought to identify distinct characteristics of the four constitutions as a means of best individualizing the treatment approach.[2–6] Generally, the personality traits of the TY type include a creative, positive, progressive temperament, and the type is characterized by hyperactive lung and hypoactive liver functions. The SY type personality is unstable, easily bored, and restrained; this type is more vulnerable to urinary diseases due to hypoactive kidney function. The TE type temperament is gentle, resilient, and

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humorous; physiologically, TE types are characterized by hyperactive liver and hypoactive lung functions. Finally, the SE type is characterized by a negative and self-directed personality and nervous mind; physiologically, the associated hyperactive kidney and hypoactive spleen function result in dysfunction of food intake and digestion.

SCTs are vulnerable to diseases related to their corresponding hypoactive organ. Hence, many studies have investigated the association between SCTs and pathologic conditions. The TY type is vulnerable to muscular malfunctions because of higher catabolism/anabolism ratio, which might lead to reduced muscle protein synthesis.[1,7] In contrast, the TE type tends to be an anabolism-dominant state, which stimulates energy storage.[1] The TE type has a higher likelihood of having cardiovascular and metabolic disorders, such as diabetes mellitus (DM), hypertension (HTN), and hyperlipidemia.[8–10] The hypoactive kidney function of the SY type manifests as enhanced susceptibility to urinary system diseases, such as cystis and renal diseases.[11–13] The SE type, which is dysfunctional in food intake and digestion, frequently reports chronic indigestion, gastroptosis, and gastroadynamics.[8,12,14,15]

Irritable bowel syndrome (IBS) is one of the most common functional gastrointestinal disorders. IBS is characterized by abdominal discomfort or pain, bloating, abnormal stool form, and frequency and changes in bowel habits without an organic disease.[16,17] The prevalence of IBS is approximately 10%–20% in the general global population, although it varies according to the diagnostic criteria used.[16,18,19] In Korea, the prevalence of IBS is 2.2%–6.6%[20,21] and 22.3%[22] when diagnosed by Rome II criteria and Manning criteria, respectively. IBS can result from a variety of causes involving genetic factors, dietary, inflammation, psychiatric stress, and dysregulation of the autonomic nervous system in the gut, which leads to altered motility and visceral hypersensitivity.[23–25] IBS negatively affects health-related quality of life and work productivity, and appreciably increases health care costs.[26,27]

The hypotheses here are that the presence of IBS will be higher in the SE type than other constitutions for the following reasons: (1) dysfunction in the digestive system is frequently reported in the SE type, (2) IBS can be triggered or exacerbated by stress, and (3) the SE type has a temperament vulnerable to psychological stress. This study investigated the association between the SCTs and IBS in a population-based cohort in Korea.

Methods

Study sample

A cross-sectional design was adopted using data acquired from participants enrolled in the Korean Genome and Epidemiology Study (KoGES). Briefly, the cohort consisted of 5020 Koreans aged 40 to 69 years who participated from 2001 and who had undergone a comprehensive health examination at Korea University Ansan Hospital. The participants had biannual follow-up and were examined for demographic information, anthropometric measurements, biochemical analyses, and blood pressure. In addition, all participants completed an interview-based questionnaire on demographic information, medical history, and health conditions. Cohort members were followed up biennially with a scheduled site visit for similar interviews and health examination. In this study, 1362 individuals (705 men and 657 women) who completed the IBS questionnaire and were classified as one of the SCT types (TE, SE, and SY; none were classified as TY type) were included for the analysis. All participants signed an informed consent form. The Institutional Review Board at the Korea University Ansan Hospital reviewed and approved this study.

Classification of SCTs

An integrated diagnostic model was used to classify the participants as each constitutional type.[3] The accuracy of the diagnostic method used in the present study is 64% in men and 55.2% in women. The model integrates four individual quantitative data (facial images, body shape, voice features, and response to a questionnaire on personality and physiologic symptoms) into an integrated value. Briefly, the facial images of participants were photographed with a digital camera and variables expressing facial characteristics were extracted via image processing techniques from the images. Variables such as width, height, areas, angle, depth, and ratio of face shape, forehead, eye, upper eyelid, and noses were included for facial points and contours. Measurements for the body shape analysis include the following 11 items: forehead circumference, neck circumference, axillary circumference, chest circumference, rib circumference, waist circumference, pelvic circumference, hip circumference, height, weight, and body–mass index (BMI). The Hidden Markov Model Toolkit (Cambridge University Engineering Department, Cambridge, United Kingdom) program and the Praat voice analysis program (University of Amsterdam, Amsterdam, the Netherlands) were used to extract voice features. Among the initially selected several hundred features, only a voice signal having the minimum duration of 40 ms was selected for final diagnostic model after application of a genetic algorithm-based feature selection technique.

The questionnaire for SCTs elicits information on personality characteristics and physiologic symptoms. It consisted of 67 multiple-choice questions that can specify general temperaments, eating habits (e.g., regular meals, frequency of meals eaten each day, and eating speed) and physiologic symptoms (e.g., perspiration, excrement, discomfort in the body, location of discomfort during illness, and existence of fatigue).

Definition of IBS

Rome II criteria were used to diagnose IBS.[28] For a diagnosis of IBS, abdominal pain or discomfort for at least 12 weeks in the preceding 12 months associated with two or more of the following must have existed: (1) relief with defecation; (2) onset associated with a change in frequency of stool; and/or (3) onset associated with a change in the form (appearance) of stool.

Questionnaire on lifestyle, measurement of anthropometric and biochemical parameters, and definition of chronic diseases

BMI was calculated by dividing weight in kilograms by height in meters squared. Waist circumference (cm) was

measured at the narrowest point between the lower rib and the iliac crest. Blood pressure (BP) was measured with a mercury sphygmomanometer in a sitting position. Questions on the smoking status (never, former, or current), alcohol consumption (g/d), income (monthly wage of <100, 100–200, 200–400, $>400\times10^4$ won), physical activity (metabolic equivalent per hour daily), exercise (30 min two times per week, yes or no), and regular meals (0–2 days/week, 3–4 days/week, 6–7 days/week) were included in the questionnaire. Levels of total cholesterol, triglyceride (TG), high-density lipoprotein (HDL) cholesterol, low-density lipoprotein (LDL) cholesterol, and high-sensitivity C-reactive protein (hsCRP) was determined in the Seoul Clinical Laboratories (Seoul, Korea). The participants were defined as having HTN if systolic BP/diastolic BP exceeded 140/90 mmHg or antihypertensive medications were used. DM was defined using antihyperglycemic agents or insulin, or with fasting glucose >126 mg/dL.

Questionnaire on sleep and mood status

Self-reported sleep duration, daytime sleepiness, and depressive mood were evaluated. To address sleep duration, the participants were queried on the average nightly number of hours of sleep estimated over the prior month. Daytime sleepiness was assessed by the Epworth Sleepiness Scale.[29] Participants who had a score >11 were defined as having excessive daytime sleepiness. A Korean translated Beck Depression Inventory (BDI) questionnaire was used to define depression.[30,31] Depressive mood was defined with a score >16.[32] Degree of psychological distress was assessed using the Psychological Well-Being Index-Short Form (PWI-SF). A PWI-SF score ≥27 indicated a high risk of experiencing distress.[33]

Statistical analyses

Statistical analyses were performed with SAS software, version 9.1 (SAS Institute, Cary, NC). Descriptive data on characteristics of participants are presented as mean $\pm$ standard deviation for continuous variables and as percentages for categorical variables. One-way analysis of variance analysis and chi-square test for continuous variables and categorical variables were conducted to evaluate significant differences of the means among the SCTs, respectively. Bonferroni *post hoc* test was performed for multiple comparisons. Multiple logistic regression models were examined to identify an independent association between IBS and the SCTs after adjustment for age, sex, BMI, regular meals, smoking status, alcohol consumption, total physical activity, depression, income, and presence of HTN and DM. Multiple logistic regression analyses were repeated with stratification by sex. The null hypothesis was rejected at a p-value <0.05.

Results

Characteristics of study sample

The 1362 participants who completed the questionnaire for IBS and were classified per SCT were included for the analysis. Table 1 describes the demographic and clinical characteristics of the SCTs. Among 750 participants who belonged to the TE type, 74 (9.9%) had IBS. Thirty-three (18.3%) of the SE type had IBS. IBS was found in the 57 (13.2%) of the SY type. The mean age of the participants was 52.9 ± 7.5 years, 49.7 ± 5.5 years, and 50.8 ± 6.3 years for the TE, SE, and SY types, respectively ($p<.0001$). The TE type showed a significantly older age; higher frequency of women; higher BMI; greater alcohol consumption, physical activity, TG, systolic and diastolic BP, and presence of HTN and DM; and lower HDL cholesterol than those of the SE and SY types. Total cholesterol was significantly higher in the TE type compared with the SE type. Smoking status and income significantly differed among the SCTs. Level of hsCRP, which is a marker of systemic inflammation,[34] did not differ among the SCTs. IBS was the most prevalent in men of the SE type ($p<.001$), while no significant association was observed in women among the SCTs.

Sleep and mood status according to SCT

Given that IBS can be developed or exacerbated by psychiatric stress and the significant associations between sleep disturbances and IBS,[35–37] we compared the factors of sleep and mood among the SCT types (Table 2). Among variables of mood status, PWI-SF score and psychological distress were significantly higher in the SE type than in the TE and SY types, implying that SE individuals experience more psychological stress than do other constitutions. Self-reported sleep duration and excessive daytime sleepiness did not differ among the SCTs.

Odds ratios for IBS according to SCT

To estimate odds ratios (ORs) for IBS in relation to constitutional types, a logistic regression analysis was conducted in both sexes (Table 3). In crude analysis by sex, the SE type was more likely to have IBS than the TE type. Even after adjustment for age, sex, BMI, alcohol consumption, smoking status, income, physical activity, HDL cholesterol, TG, HTN, DM, and PWI-SF score, the SE type of both sexes continued to show 1.82-fold (95% confidence interval [CI], 1.05–3.16; $p=0.03$) greater odds of having IBS. However, the OR was not significant when compared with the SY type in both crude and multivariate analyses. In sex-specific analysis, men with SE type had a 2.97 times (95% CI, 1.34–6.58; $p<0.01$) and 2.50 times (95% CI, 1.15–5.47; $p=0.02$) higher odds of having IBS than those with the TE type and SY type, respectively, after adjustments for multiple variables. However, in women this association was not found in either crude or multivariate analyses.

Joint effects of the SCTs and PWI-SF score on IBS in men

Table 4 presents the joint effects of the SCTs and PWI-SF score, a variable that reveals the degree of depression, on IBS in male participants. In multivariate analysis for the SCTs and PWI-SF, the multivariate ORs of IBS were 3.21 (95% CI, 1.33–7.75; $p<0.01$) for the SE type and PWI-SF score (<27), 5.83 (95% CI, 1.80–18.88; $p<0.01$) for the SE type and PWI-SF score (≥27), and 3.87 (95% CI, 1.06–14.18; $p=0.04$) for the SY type and PWI-SF score (≥27) compared with the TE type and PWI-SF score (<27). However, no significant association was observed in the analysis for the joint effect of the TE type and PWI-SF (≥27) and the SY type and PWI-SF score (<27) when compared them with the TE type and PWI-SF score (<27).

Table 1. General Characteristic of Participants According to Sasang Constitutional Types

Variable	*TE*	*SE*	*SY*	p-*Value*
Participants (*n*)	750	180	432	
Age (y)	52.9 ± 7.5*	49.7 ± 5.5	50.8 ± 6.3	< 0.0001
Women, *n* (%)	452 (60.3)	91 (50.6)	162 (37.5)	< 0.0001
BMI (kg/m^2)	26.2 ± 2.3*	21.4 ± 1.7	23.2 ± 2.1	< 0.0001
Smoking, *n* (%)				
Never	389 (51.9)	121 (67.2)	304 (70.4)	< 0.0001
Former	226 (30.1)	28 (15.6)	72 (16.7)	
Current	135 (18)	31 (17.2)	56 (13.0)	
Alcohol consumption (g/d)	4.7 ± 7.1*	2.3 ± 3.9	2.8 ± 5.6	< 0.0001
Regular meals, *n* (%)				0.35
0–2/wk	72 (9.7)	13 (7.2)	53 (12.3)	
3–4/wk	87 (11.7)	21 (11.7)	53 (12.3)	
6–7/wk	587 (78.7)	146 (81.1)	324 (75.3)	
Income, *n* (%)				0.02
$< 100 \times 10^4$ won	94 (12.5)	14 (7.8)	45 (10.4)	
$100–200 \times 10^4$ won	119 (15.9)	31 (17.2)	68 (15.7)	
$200–400 \times 10^4$ won	327 (43.6)	100 (55.6)	222 (51.4)	
$> 400 \times 10^4$ won	210 (28)	35 (19.4)	97 (22.5)	
Exercise 30 min 2 times/wk, *n* (%)	204 (42.3)	47 (36.7)	135 (45.5)	0.12
Physical activity (MET)	198.8 ± 364.8*	137.7 ± 184.7	168.5 ± 222.9	0.03
Total cholesterol (mg/dL)	199.1 ± 34.1**	191.0 ± 33.7	194.8 ± 32.6	< 0.01
Triglyceride (mg/dL)	156.2 ± 101.9*	108.3 ± 54.7	121.4 ± 80.0	< 0.0001
HDL cholesterol (mg/dL)	43.3 ± 9.2*	46.9 ± 10.8	47.0 ± 10.7	< 0.0001
LDL cholesterol (mg/dL)	125.6 ± 30.8	122.6 ± 27.9	124.2 ± 29.0	0.43
hsCRP (mg/dL)	1.4 ± 2.2	1.2 ± 2.4	1.3 ± 3.0	0.45
SBP (mmHg)	114.3 ± 13.7*	108.1 ± 15.3	108.9 ± 14.5	< 0.0001
DBP (mmHg)	76.8 ± 9.7*	72.9 ± 9.7	72.4 ± 10.2	< 0.0001
HTN, *n* (%)	215 (28.7)	25 (13.9)	63 (14.6)	< 0.0001
DM, *n* (%)	142 (18.9)	13 (7.2)	46 (10.6)	< 0.0001
IBS, *n* (%)				
Men	40 (8.9)	21 (23.1)	16 (9.9)	< 0.001
Women	34 (11.4)	12 (13.5)	41 (15.2)	0.41

Values expressed with a plus/minus sign are the mean ± standard deviation.
*$p < 0.0001$ versus SE and SY types.
**$p < 0.05$ versus SE type.
TE, Tae-eum type; SE, So-eum type; SY, So-yang type; BMI, body–mass index; MET, metabolic equivalents per hour daily; HDL, high-density lipoprotein; LDL, low-density lipoprotein; hsCRP, high-sensitivity C-reactive protein; SBP, systolic blood pressure; DBP, diastolic blood pressure; HTN, hypertension; DM, diabetes mellitus; IBS, irritable bowel syndrome.

Discussion

The aim of this study was to examine the association between the SCTs and IBS in a large population in Korea. Based on cross-sectional data from the KoGES, these findings reveal that the SE type is an independent risk factor for IBS, even after controlling for potential confounders. However, the significant association was found only in men. In addition, a synergistic effect of psychological stress and the SE type on IBS was evident.

Previous studies for the SCTs and gastrointestinal function have been based on the response to questionnaires

Table 2. Sleep and Mood Profiles According to Sasang Constitutional Types

Variable	*TE*	*SE*	*SY*	p-*Value*
Participants (*n*)	750	180	432	
BDI score	7.9 ± 6.6	8.6 ± 6.3	7.4 ± 6.4	0.08
Depressed mood, *n* (%)	96 (12.8)	23 (12.8)	42 (9.7)	0.27
PWI-SF score	17.3 ± 8.5	19.8 ± 8.6*, **	17.1 ± 8.0	< 0.001
Psychological distress, *n* (%)	101 (13.5)	38 (21.1)	51 (11.8)	0.01
Self-reported sleep duration (h)	6.7 ± 1.3	6.7 ± 1.2	6.8 ± 1.5	0.81
EDS, *n* (%)	62 (8.3)	13 (7.2)	46 (10.6)	0.27

Values expressed with a plus/minus sign are the mean ± standard deviation.
BDI, Beck Depression Inventory; PWI-SF, Psychological Well-Being Index-Short Form; EDS, excessive daytime sleepiness.
*$p < 0.001$ versus TE type.
**$p < 0.0001$ versus SY type.

Table 3. Odds Ratio of Irritable Bowel Syndrome in Relation to Sasang Constitutional Types

	Estimated odds ratios of IBS (95% CI)			
Group	*SE vs. TE [ref.]*	p-*value*	*SE vs. SY [ref.]*	p-*Value*
Men and women				
Crude	2.05 (1.31–3.21)	<0.01	1.48 (0.92–2.36)	0.1
Model 1[a]	1.77 (1.03–3.03)	0.04	1.47 (0.91–2.37)	0.12
Model 2[b]	1.82 (1.05–3.16)	0.03	1.39 (0.86–2.27)	0.18
Men				
Crude	3.09 (1.72–5.55)	<0.001	2.74 (1.35–5.57)	<0.01
Model 1[c]	2.86 (1.36–6.00)	<0.01	2.60 (1.24–5.45)	0.01
Model 2[d]	2.97 (1.34–6.58)	<0.01	2.50 (1.15–5.47)	0.02
Women				
Crude	1.21 (0.60–2.45)	0.6	0.87 (0.44–1.74)	0.69
Model 1[c]	1.21 (0.51–2.90)	0.66	0.92 (0.45–1.88)	0.83
Model 2[d]	1.30 (0.53–3.20)	0.56	0.84 (0.40–1.76)	0.65

[a]Data were adjusted for age, sex, and body–mass index (calculated as weight in kilograms divided by height in meters squared).
[b]Data were adjusted for age, sex, body–mass index (calculated as weight in kilograms divided by height in meters squared), smoking status (never, former, or current), alcohol consumption (g/d), income (monthly wage of <100, 100–200, 200–400, $>400\times10^4$ won [South Korean Currency]), physical activity (metabolic equivalent per hour daily), Psychological Well-Being Index-Short Form score (<27 or ≥27), high-density lipoprotein cholesterol, triglyceride, and presence of hypertension and diabetes mellitus.
[c]Data were adjusted for the same variables with [a] except for sex.
[d]Data were adjusted for the same variables with [b] except for sex.
CI, confidence interval; ref, reference.

regarding symptoms related to the gastrointestinal system, and these studies have consistently reported high frequencies of indigestion, abdominal pain, and abnormal appearance of stool in the SE type,[8,12,14] which are symptoms suspicious for IBS. No previous studies, however, appear to have investigated the direct association of IBS and the SCTs.

Findings from most epidemiologic studies performed in Western countries have consistently reported that IBS is more prevalent in women than in men,[38,39] and the number of patients who seek health care services for IBS is 2–4 times higher in women than in men.[40,41] But, unlike in previous studies performed in the United States and other Western industrialized countries, the current study found a significant association only in men in the SE type when multivariate logistic regression analysis stratified by sex was performed. Moreover, in other studies conducted in Asian countries, including Korea, IBS was reported to occur in men more often than in women.[42–44] The reason for the discrepancy in the occurrence of IBS according to sex between Western and Asian countries is unclear but could be the result of cultural, psychosocial, or healthcare access issues, rather than purely sex-related physiologic differences.[45]

The mechanism underlying the relationship between the SE type and IBS is unknown. The cause of IBS seems to be multifactorial. Inflammation is known to affect IBS.[46] However, we found no significant difference in the potential factor among the SCTs (e.g., hsCRP [Table 1]). Stress response to psychological stress can also be a possible mediator for the relationship. When stress occurs, several systems involved in brain outputs relaying emotional function, such as the hypothalamic-pituitary-adrenal (HPA) axis and autonomic nervous system (ANS), are altered to control stability or homeostasis of the body (allostasis).[24,47,48]

The HPA axis and ANS play pivotal roles in the regulation of sensitivity, motility, secretion, and immune function

Table 4. Odds Ratio of Irritable Bowel Syndrome in Men for Joint Effect of Psychological Well-Being Index-Short Form Score with Sasang Constitutional Types

Joint effects of PWI-SF and SCTs	*Participants* (n)	*Multivariate OR (95% CI)*[a]	p-*Value*
PWI-SF (<27) and TE type	401	Reference	NA
PWI-SF (≥27) and TE type	51	2.35 (0.98–5.63)	0.06
PWI-SF (<27) and SE type	72	3.21 (1.33–7.75)	<0.01
PWI-SF (≥27) and SE type	19	5.83 (1.80–18.88)	<0.01
PWI-SF (<27) and SY type	145	1.10 (0.50–2.39)	0.82
PWI-SF (≥27) and SY type	17	3.87 (1.06–14.18)	0.04

[a]Data were adjusted for age, sex, body–mass index (calculated as weight in kilograms divided by height in meters squared), smoking status (never, former, or current), alcohol consumption (g/d), income (monthly wage of <100, 100–200, 200–400, $>400\times10^4$ won), physical activity (metabolic equivalent per hour daily), Psychological Well-Being Index-Short Form score (<27 or ≥27), high-density lipoprotein cholesterol, triglyceride, and presence of hypertension and diabetes mellitus.
SCT, Sasang constitutional type; OR, odds ratio; NA, not applicable.

in the gastrointestinal system.[24,47,49] Thus, sustained stress may result in abnormal susceptibility or motility of the gastrointestinal system, which can account for the pathogenesis of IBS by altering the HPA axis and ANS, in terms of brain-gut interactions.[24,50] To examine the contribution of stress on the IBS among the SCTs, we performed an analysis stratified by PWI-SF score. A high degree of psychological stress defined as PWI-SF score (≥ 27) additionally increased the OR of having IBS in the SE and SY types. The trend was also evident in the TE type but was not statistically significant. The analysis showed that the joint effect of a high level of psychological stress and the presence of the SE type was more detrimental for IBS than the sole effect of the presence of the SE type. However, given that those with the SE type, who have an inherently low stress level, already have significantly higher odds of having IBS, high psychological stress found in the SE type cannot entirely explain the high prevalence of IBS in this type.

Some limitations of this study are worth noting. First, the causal relationship could not be established because the study was cross-sectional. Second, the age of participants was limited to middle age. Given that prevalence of IBS is relatively high in younger people and is markedly less in those older than 50 years of age, as well as that 40% of IBS cases occur between 35 and 50 years of age,[21] the possibilities of bias from age distribution cannot be ruled out. Third, we did not perform a subtype analysis of IBS, which could have provided detailed information on the features of IBS in the SCTs, because of the small number of participants when divided into the subgroups. Fourth, we did not have any diet information among the SCTs. Dietary factors can be important in inducing symptoms related with IBS.[51] Fifth, a strict definition of IBS in the absence of other organic causes, such as a structural or biochemical alteration, should be confirmed through colonoscopy,[28] but in a large cohort-based epidemiologic study it is very difficult to perform such an examination.

In conclusion, SE type is an independent risk factor for IBS. These findings support the hypothesis that the SE type is vulnerable to diseases related to the gastrointestinal system. Further investigations are required to elucidate the mechanisms underlying the association.

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Author Disclosure Statement

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