The association between irritable bowel syndrome and the coexistence of depression and insomnia

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ABSTRACT

Objective: The individual occurrence of depression or insomnia is a risk factor for irritable bowel syndrome (IBS), but few researchers have evaluated the association between comorbid depression and insomnia and IBS. The aim of the present study is to explore the relationship between IBS and the coexistence of depression and insomnia in a Korean population-based cohort study.

Methods: A total of 3429 individuals who were enrolled in the Korean Genome and Epidemiology Study were analysed. Of the participants, 10.9% (n = 374) were diagnosed with IBS based on the Rome II criteria. Regarding depressive symptoms, subjects were sub-divided into three groups based on the Beck Depression Inventory (BDI) score. Insomnia was defined as a positive response to at least one of three questions on sleep states.

Results: The odds ratio (OR) of IBS increased proportionally as depressive symptoms worsened (OR: 1.64; 95% CI: 1.21–2.23 in middle tertile and OR: 2.61; 95% CI: 1.92–3.55 in highest tertile). Subjects with insomnia showed a higher OR of IBS than those without insomnia (OR: 1.81; 95% CI: 1.44–2.27). In the joint analysis of BDI and insomnia, the odds for IBS were significantly higher in all BDI tertiles with insomnia than in the corresponding BDI tertiles without insomnia. There was no significant interaction effect of BDI tertile and insomnia on IBS.

Conclusion: The presence of both depression and insomnia is significantly associated with IBS compared to each individual occurrence. Further prospective investigations are needed to explore possible causality between comorbid depression and insomnia and IBS.

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1. Introduction

Irritable bowel syndrome (IBS) is a common chronic, relapsing gastrointestinal problem characterised by abdominal discomfort or pain, bloating, abnormal stool form and frequency, straining at defecation, and urgency [1,2]. IBS affects 5% to 11% of individuals in the general global population, as evaluated using the Manning, Rome I, and Rome II diagnostic criteria [3]. In Korea, the prevalence of IBS has been reported at 6.6% [4] and 11.1% [5] using a Rome II criteria–based questionnaire. Those different prevalence values could result from differences in age distribution, gender ratio, or survey method. IBS has a significant negative effect on health-related quality of life and work productivity [6–8], including significant health care costs and economic losses. However, the pathophysiology and associated disorders or conditions associated with the initiation and development of IBS remain poorly understood.

IBS has been associated with a high incidence of psychiatric comorbidity. According to Guthrie et al., 44% of patients with IBS had psychiatric comorbidity, and the most common conditions were depressive disorders and anxiety-related conditions [9]. A high prevalence of depression has been observed in patients with IBS [10].

Numerous studies have also reported an association between sleep disturbances and IBS. According to the findings of previous studies, sleep problems, such as sleep quality dissatisfaction, increased daytime sleepiness, prolonged sleep latency, and frequent sleep fragmentation (examined via self-report questionnaires and polysomnography), are common in patients with IBS [11–14]. In addition, sleep problems such as insomnia and poor quality of sleep influence IBS symptoms [15,16]. Thus, whether subjective or objective, sleep problems are closely associated with IBS symptoms.

Although a considerable number of studies have identified individual associations between depression and IBS and between insomnia and IBS, to our knowledge, only one study has examined the association between comorbid depression and insomnia and IBS symptom burden [17]. However, the limitations of that study include a small number of study subjects (n = 175), absence of a control group, a high proportion of female subjects, and the use of clinic-based data. Therefore, we aimed

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to evaluate and confirm the association between IBS and the coexistence of depression and insomnia in a population-based cohort study in Korea.

2. Method

2.1. Subjects

The community-based cohort of the Korean Genome and Epidemiology Study, undertaken at Korea University Ansan Hospital beginning in 2001, comprises 5020 Koreans (2523 men and 2497 women) aged 40–69 years. Detailed information on the study procedures and design is available elsewhere [18,19]. Subjects continue to participate in comprehensive health examinations with on-site interviews to collect demographic information, medical history, and health conditions every 2 years. Data from the third biennial examination from March 2005 to February 2006 were used for the present study, because the questionnaire about IBS was added during that follow-up period. Questionnaires on depression and insomnia were obtained at each visit; however, to minimise the bias from multiple time points for outcome measurements, only data acquired during the third follow-up period were used. After excluding participants with missing data or organic gastrointestinal disease or substance abuse, data from 3429 individuals (1789 men and 1640 women) were included for the analysis. All participants provided informed consent, and the study was approved by the Human Subjects Review Committee at Korea University Ansan Hospital.

2.2. Diagnosis of IBS

Using the Rome II criteria [20], IBS was diagnosed based on responses, and participants were divided into two groups (non-IBS and IBS, n = 3055 and 374, respectively). To be diagnosed with IBS, patients had to report abdominal pain or discomfort for at least 12 weeks during the preceding 12 months and two or more of the following: [1] relieved with defecation; [2] onset associated with a change in frequency of stool; and [3] onset associated with a change in the form (appearance) of stool.

2.3. Measurement of depression

The Beck Depression Inventory (BDI), a 21-item self-reported inventory, was used to define depression [21]. Possible BDI scores range from 0 to 63, with higher scores representing greater depressive symptomatology. Several studies have investigated the reliability and validity of the BDI in Korea [22–24]. In the present study, BDI scores were divided into tertiles. A Korean translation of the BDI questionnaire was used.

2.4. Measurement of insomnia

Insomnia was identified using questionnaires that asked participants to consider the month prior to the study visit: [1] 'Did you have difficulty falling asleep at night?' (difficulty initiating sleep); [2] 'Did you awaken but have difficulty in getting back to sleep at night?' (difficulty maintaining sleep); and [3] 'Did you wake up too early in the morning?' (early morning awakening). Participants were asked to choose one of the following as an answer: never, 1–2 nights/week, 3–4 nights/week, 5–6 nights/week, or every night. Insomnia was defined as an answer of 3–4 nights/week or higher for any of the questions.

2.5. Questionnaire on lifestyle and anthropometric measurements

Body mass index (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. Participants also answered questions about occupation (housework, white-collar job, blue-collar job), smoking status (never, former, current), drinking status (never, former, current), income (monthly wage

<2000, 2000–4000, >4000 US dollars), average daily sleep (<6, 6–7, ≥8 h), physical activity (metabolic equivalent per hour daily; MET), and regular meals (0–2 days/week, 3–4 days/week, 5–7 days/week).

2.6. Statistical analysis

Statistical analysis was performed with SAS software (SAS 9.1, SAS Institute Inc., Cary, NC, USA). For continuous variables, statistical difference of the means was evaluated using an independent t-test. For categorical variables, statistical differences were assessed using a chi-square test. Univariate and multivariate logistic regression analyses were conducted to estimate the odds ratio (OR) of IBS in relation to BDI score and insomnia and was reported with a 95% confidence interval (CI). The potential confounding variables included in the multivariate model for BDI and insomnia were age, gender, BMI, regular meals, sleep time group, smoking status, drinking status, and total physical activity (MET). In addition, the odds ratio of having IBS was estimated in relation to coexisting depressive symptoms and insomnia and their interaction.

3. Results

3.1. Characteristics of study participants

The general characteristics of the 3429 participants who completed the questionnaire for IBS are summarised in Table 1. Of the total participants, 52.2% were men (n = 1789), and 10.9% (n = 374) were diagnosed with IBS. The mean age was 52.6 years [standard deviation (SD) 7.5] for the non-IBS group and 51.8 years (SD 7.3) for the IBS group, a statistically significant difference (P = 0.0362). The IBS group was less obese than the non-IBS group.

Table 1
Characteristics of the subjects with or without IBS.

Variable	Non-IBS (n = 3055)	IBS (n = 374)	P value
Age, years	52.6 ± 7.5[a]	51.8 ± 7.3	0.0362
Women, n (%)	1454 (47.6)	186 (49.7)	0.4345
Waist (cm)	81.7 ± 8.0	80.5 ± 7.6	0.0089
Height (cm)	161.9 ± 8.2	161.9 ± 8.8	0.9910
BMI (kg/m²)[b]	24.6 ± 2.8	24.2 ± 2.7	0.0075
Drinking status			
Never drinker, n (%)	1323 (43.3)	153 (40.9)	0.3070
Former drinker, n (%)	179 (5.9)	17 (4.5)	
Current drinker, n (%)	1552 (50.8)	204 (54.5)	
Smoking status			
Never smoker, n (%)	551 (18.0)	77 (20.6)	0.1403
Former smoker, n (%)	1916 (62.7)	240 (64.2)	
Current smoker, n (%)	583 (19.1)	57 (15.2)	
Physical activity[c]	44.8 ± 7.6	44.1 ± 7.5	0.1067
Occupation, n (%)			
Housework	929 (30.4)	118 (31.6)	0.2243
White-collar job	903 (29.6)	123 (32.9)	
Blue-collar job	1220 (39.9)	133 (35.6)	
Regular meals, n (%)			
6–7 day	2363 (77.3)	274 (73.3)	0.1835
3–4 day	347 (11.4)	48 (12.8)	
0–3 day	329 (10.8)	50 (13.4)	
Household income (US dollars), n (%)			
<2000	1009 (33.0)	122 (32.6)	0.9294
2000–4000	1354 (44.3)	164 (43.9)	
≥4000	692 (22.7)	88 (23.5)	
Married, n (%)	2817 (92.2)	342 (91.4)	0.7352
Average daily sleep (h/d), n (%)			
<6	1795 (58.8)	220 (58.8)	0.0863
6–7	723 (23.7)	74 (19.8)	
≥8	536 (17.5)	80 (21.4)	

Abbreviations: IBS, irritable bowel syndrome; BMI, body mass index.
[a] Values are mean ± standard deviation.
[b] Calculated as weight in kilograms divided by height in meters squared.
[c] Average daily metabolic equivalents per hour.