

Are Food Constituents Relevant to the Irritable Bowel Syndrome in Young Adults? - A Rome III Based Prevalence Study of the Korean Medical Students

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Background/Aims

Irritable bowel syndrome (IBS) is prevalent in general population. This study investigates the prevalence of IBS in medical college students in Korea as well as the influence of dietary habits and nutritional intake on IBS.

Methods

This study is a cross-sectional study of 319 students (239 males and 80 females, age 22.3 ± 2.5 years) from the 6 grade levels of the Medical College in Korea. All students filled out a self-reported questionnaire for ROME III criteria. They also completed a questionnaire to validate dietary habits and food frequency in Korean.

Results

The overall prevalence of IBS was 29.2% without correlation to age, body mass index and grade level in Medical School. However, the prevalence was significantly higher in females than males (33/80 vs 60/239, $P = 0.007$). There were no significant differences between the IBS-group and the non-IBS group in aspect of nutrition. Not only the diet habits, but also the daily nutritional intake, and even the breakdown into the 12 micronutrients, yielded no significant differences between the 2 groups.

Conclusions

Twenty-nine percent of the medical college students have IBS with a greater prevalence in females. The dietary habits and nutritional intake of the students might not be associated with IBS.

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Key Words

Food habits; Irritable bowel syndrome; Prevalence

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Introduction

Irritable bowel syndrome (IBS), one of the commonly presented functional gastro-intestinal disorders,¹ has a reported prevalence of 3%-22% in most Western countries² and 5%-10% in most of Asia.³ This prevalence of IBS is affected by the diagnostic criteria used.

Although IBS is characterized with abdominal pain and altered bowel activity, it lacks any pathological organic changes. These symptoms are most frequently employed in making a differential diagnosis with the Rome III criteria.⁴

Generally, race,⁵ gender,⁶⁻⁹ age,¹⁰⁻¹² marital status,^{13,14} stress,^{6-8,13-16} food,^{11,14,17-19} or alcohol and tobacco use¹¹ have been considered as risk factors to IBS. In particular, the food or nutritional intake has been estimated to be closely associated with the pathophysiology of IBS.¹⁹ Several IBS studies have been performed since the publication of the Rome III criteria in 2006.^{1,4,20-22} However, there are only limited number of studies regarding the prevalence of IBS assessed by the Rome III criteria in not only the Korean general population, but also in a group of medical students. There are fewer reports about the relationship between dietary intake and gastrointestinal symptoms in well designed systematic research.^{18,23}

We investigated the prevalence of IBS in medical college students in Korea using the Rome III criteria for diagnosis. The influence of dietary habits and nutritional intake on IBS was also reported.

Materials and Methods

Subjects

A total of 319 students (2 grade levels of premedical courses and 3 grade levels of medical courses) of Kosin University, Medical College in Busan, Korea were studied in the winter of 2008. Actually, the medical course consists of 4 grade levels, but the fourth graders were excluded in this study because of their academic calendar. All students were asked to complete a self-reported questionnaire using the ROME III criteria. The questionnaire was a self translation of English version. They also validated their dietary habits and food frequency via a questionnaire in Korean. We obtained the informed consent from all the participants. Every analysis and questionnaire was carried out in accordance with appropriate Institutional Review Board regulations and approval.

Study Protocol

The first questionnaire (Rome III questionnaire) had 29 items using the Rome III criteria.²⁴ There were several general items such as gender, age, height and weight. More specific items about the presence and frequency of abdominal pain or discomfort, its onset, the correlation between frequency or form of the stool and the pain, and improvement of the symptoms after defecation were also included. The diagnosis of IBS required that the student reported not only abdominal pain or discomfort at least 3 days a month in the last 3 months, but also at least 2 of the following 3 symptoms: relief of pain or discomfort after defecation, onset of pain or discomfort associated with a change of frequency of stool, and a change of appearance of stool.

The second questionnaire (Food Frequency Questionnaire) had 14 items to validate dietary habits along with alcohol and tobacco use.²⁵ These items included not only the frequency, regularity and speed of consumption of the meal, but also the frequency of the oily, caffeinated, salted or fast food intake. Other items included the student's living situation such as living with family or apart from family as well as income or pocket money for a month. Another question inquired if the student had the average intake during 1 year in about 109 foods, which were common foods in Korea. Then, the nutritional value of each item was determined. These values included not only the amount of energy, protein, fat and carbohydrate, but also the amounts of calcium, phosphate, iron, zinc, vitamin A, B1, B2, B6, C, E, niacin and folate. The dietary consumption was evaluated as being either low, adequate or high as compared to the Korean recommended dietary allowance.

Statistical Methods

We compared the grade level, gender, body mass index and dietary habits as well as each nutritional factor between the non-IBS and IBS group using the Chi-squared test and Fisher's exact test. Data were expressed as frequency or mean with SD. *P*-values < 0.05 were considered to indicate statistical significance. Statistical analyses were performed using a SPSS (Version 15.0 for Windows; SPSS Inc, Chicago, IL, USA).

Results

Subjects Characteristics and Prevalence of Irritable Bowel Syndrome

Of 480 students, 319 (66.5%) completed the questionnaires.

The mean age of included subjects was 22.3 ± 2.5 years (range 18-36) and 239 (74.9%) were male.

Ninety-three students (60 male, 33 female) had symptoms of IBS. Therefore, overall prevalence of IBS was 29.2% without correlation to age, body mass index and grade level of medical course. The female group showed higher prevalence (33/80, 41.3%) than male (60/239, 25.1%). The prevalence of IBS among the 2 premedical level courses and 3 medical courses were 28%, 38%, 30%, 34% and 16%, respectively, and showed no difference among each grade level (Table 1).

The IBS group was subdivided into diarrhea predominant (IBS-D), constipation predominant (IBS-C), mixed with diar-

rhea and constipation (IBS-M), or undetermined categories (IBS-U) according to the bowel movement frequency and stool consistency. Among the 93 IBS students, the proportions of IBS-D, IBS-C, IBS-M and IBS-U were 23.6%, 3.2%, 70.9% and 2.2%, respectively.

Irritable Bowel Syndrome and Diet Habit or Nutritional Intake

In the present study, the daily caloric intake with all the dietary factors showed no significant differences between IBS and non-IBS groups (absolute vs mean, 1,917 kcal vs 2,021 kcal). There were no significant differences between non-IBS group and IBS group, when the nutrient intake of each patient was divided into low, adequate or high by Korean's recommended dietary allowance (Table 2). No significant differences were detected in the % ratio (14.6%:21.9%:63.4% vs 14.7%:22.7%:62.6%, respectively) of protein, lipid and carbohydrate in the daily nutrition.

Table 1. Irritable Bowel Syndrome Prevalence in Order of Characteristics of Students

	Non-IBS (n = 226)	IBS group (n = 93 [%] ^a)	Total (N = 319)	P-value
Grade of course				0.063 ^b
Premedical	91	45 (33.1)	136	
Medical	135	48 (16.4)	183	
Gender				0.007 ^c
Male	179	60 (25.1)	239	
Female	47	33 (41.3)	80	

^aPrevalence of IBS, ^bAnalysed by Pearson Chi-Square, ^cAnalysed by Fisher's exact test.

IBS, irritable bowel syndrome.

Discussion

The prevalence of IBS shows great diversity. In Western countries, the IBS prevalence has been reported as 10%-24%.^{2,26-31} However, in most of Asia, it has been reported as being 5%-10% lower than western countries,³ with an especially low prevalence of 7.85% among college and university students of North China.³²

Table 2. Comparison of 2 Groups (Non-Irritable Bowel Syndrome and Irritable Bowel Syndrome) on Levels of Intake of Energy, Fat and 12 Micronutrients

	Non-IBS (n = 226)			IBS (n = 93)			P-value
	Lower (%)	Adequate (%)	Higher (%)	Lower (%)	Adequate (%)	Higher (%)	
Energy	99 (43.8)	70 (30.9)	57 (25.2)	47 (50.5)	24 (25.8)	22 (23.7)	0.51
Fat	55 (24.3)	103 (45.5)	68 (30)	23 (24.7)	43 (46.2)	27 (29.0)	0.98
Calcium	139 (61.5)	64 (28.3)	23 (10.1)	60 (64.5)	25 (26.9)	8 (8.6)	0.85
Phosphate	27 (11.9)	78 (34.5)	121 (53.5)	11 (11.8)	32 (34.4)	50 (53.7)	0.99
Iron	113 (50.0)	76 (33.6)	37 (16.3)	53 (57.0)	30 (32.3)	10 (10.7)	0.35
Zinc	129 (57.1)	74 (32.7)	23 (10.1)	54 (58.1)	30 (32.3)	9 (9.6)	0.98
Vt.A	149 (65.9)	61 (27.0)	16 (7.0)	71 (76.3)	17 (18.3)	5 (5.3)	0.18
Vt.B ₁	66 (29.2)	108 (47.8)	52 (23.0)	28 (30.1)	44 (47.3)	21 (22.5)	0.94
Vt.B ₂	112 (49.6)	84 (37.2)	30 (13.2)	50 (53.8)	30 (32.6)	13 (13.9)	0.70
Vt.B ₆	53 (23.5)	97 (42.9)	76 (33.6)	24 (25.8)	42 (45.2)	27 (29.0)	0.72
Vt.C	66 (29.2)	64 (28.3)	96 (42.4)	29 (31.2)	29 (31.2)	35 (37.6)	0.72
Vt.E	80 (35.4)	90 (39.8)	56 (24.7)	36 (38.7)	35 (37.6)	22 (23.6)	0.85
Niacin	66 (29.2)	99 (43.8)	61 (26.9)	27 (29.0)	40 (43.0)	26 (27.9)	0.98
Folate	125 (55.3)	75 (33.2)	26 (11.5)	55 (59.1)	29 (31.2)	9 (9.6)	0.79

IBS, irritable bowel syndrome.

In Korea, the reported IBS prevalence in college and university students is 5.7%,¹⁸ compared to 8.3% in those receiving a routine health check-up.³³ The prevalence in the general Korean population has been reported to be between 6.6%-9.0%.^{11,21} The diversity of prevalence in IBS mainly depends on the used diagnostic criteria and the characteristics of the included subjects. Several reports have shown that the prevalence of IBS is significantly higher when using the Rome III criteria rather than the Rome II.^{21,34,35}

The reported prevalence of IBS by the Rome III criteria was 9.0%-21.9%.³⁶ Our cross-sectional study showed 29.2% prevalence of IBS, determined on the basis of the Rome III criteria. This high prevalence was found in the medical college students. In a large scaled study in Europe, the highest prevalence (12.2%) of IBS was in the 18-34 age group,³⁰ while our student's mean age was 22.3 ± 2.5 years (range 18-36). And our subject population was not from the general population. In a study of healthy adults, which was performed in the medical students, they showed higher prevalence of IBS of 15.8%,³⁷ and suggested that the reason of the high prevalence would be from medical students, because these groups were highly stressed and more aware of somatic symptoms. The exact mechanism of psychological stress inducing abdominal symptoms has not been established yet. However, stress is an accepted contributing factor for IBS.^{6-8,13-16} This effect of stress is presented as a conceptual model of the relationship between several factors and IBS.²⁸ However, the level of stress in medical college students has not been expressed numerically. Therefore, it is uncertain that the reason of the high prevalence in our study was influenced by intensely stressful condition of medical school.

Many studies have reported that the prevalence of IBS is higher in females, and have suggested some hormonal effects for the etiology.^{17,38} Actually, in many reports, the IBS prevalence in female was higher than in male.²⁹ In our study, female prevalence of IBS was higher. Though the incidence had statistical significance, the imbalance of gender ratio (male:female = 2.98:1) in our population is a limitation of our study.

Among several risk factors, dietary components are a small part of the pathophysiological complexion of IBS.²⁸ However, it has been assumed to be associated with the pathophysiology of IBS including functional gastrointestinal disease in several studies.^{19,39} Fatty foods, beans, gas-producing foods, alcohol, caffeine and lactose (in lactose-deficient individuals) have been accepted as certain dietary substances that may aggravate gastrointestinal symptoms.^{28,40} It was reported that the high-fat diet has

a significant correlation with IBS.⁴¹ Those people that prefer spicy and salty food had a 1.80 risk of developing IBS.²³ And, there was a report of significance between the number of meals a day or types of families and IBS.¹⁸

In our study many parameters were evaluated. These items include the number of meals per day, the regularity of eating breakfast, daily meal times and the speed in consuming the food. Also included were the symptoms of lactose intolerance, the degree of saltiness of food, the frequency of overeating, fatty food intake, fast food intake and drinking caffeinated beverages. Alcohol and tobacco use, the amount of milk products ingested and hot soup or food intake were evaluated. The daily caloric intake, the energy amount ingested and the value of the micro-nutrients were also evaluated. However, we did not find any statistical significance between dietary pattern or nutritional intake and IBS. This result did not satisfy our expectation. It seems to be difficult to prove the causative relationship between IBS and dietary pattern or each nutritional factor. Moreover, since the questionnaire required the memory of dietary habits or kinds of food for a recent year, recall bias was unavoidable. And the small sample size may contribute to the insignificant results. If we had investigated much larger population, the results could have been different.

In spite of these limitations, this study is the first investigation regarding the prevalence of IBS in the Korean medical college students using the Rome III criteria. The use of the Food Frequency Questionnaire, in evaluating nutritional association with IBS is also the first.

More studies using the Rome III criteria are needed to evaluate the IBS prevalence in the Korean general population and specific groups. Since the distinct Korean foods or recipes differ greatly from Western cultures, a large scale cohort study regarding the dietary pattern or nutrients and etiology of IBS is essentially needed.

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