The Role of Affective Well-Being in Understanding the Irritable Bowel Syndrome Severity among College Female Nursing Students with Irritable Bowel Syndrome

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Abstract

The aim of our study was to identify predictors of the irritable bowel syndrome severity in college female nursing students with irritable bowel syndrome (IBS). Our analysis was based on the data of 135 students, recruited from the six nursing colleges located in D city, Korea. Affective well-being and severity in IBS were assessed using structured questionnaires. Bivariate logistic analysis was used to identify predictors of severity in IBS. Among the participants, 48.9% had a positive screening for bowel symptoms on the Irritable Bowel Syndrome Severity Scoring system–Korean Version. Exercising four or more times per month, irregular meals and lower affective well-being were associated with a higher likelihood of moderate-to-severe IBS. Outcomes of our study provide a basis for designing interventions to assist female nursing students in managing the severity in IBS.

Keywords: Affective Well-being, College Students, Irritable Bowel Syndrome, Severity, Nursing

1. Introduction

1.1. Background

Irritable bowel syndrome (IBS) refers to recurrent abdominal pain and altered bowel habits in the absence of an organic cause [1]. The prevalence of IBS in South Korea is estimated to be 2.2-9.6% among the general population [2], which is comparable to the prevalence of 5-12% reported in foreign countries [3]. The prevalence of IBS is 2-3 times higher in females than in males [1, 4]. Of concern is the estimated 28-33% prevalence of IBS among college female students in nursing programs [5, 6]. College nursing students participate in a rigorous university curriculum, which carries a heavy workload combined with the additional burden of preparing for national examination. Therefore, relative to students in other college programs, nursing students often experience negative emotions, such as stress and depression [7, 8]. The association between negative emotions and the high prevalence of IBS in female nursing students in college has been widely reported [9, 10].

Although a definite cause of IBS has not yet been identified, visceral sensitivity, brain-gut interaction, infection, genetics, and psychological factors are likely to play a contributing role in the development of IBS [11]. In particular, altered autonomic control

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of visceral sensitivity and brain-gut interactions has been considered to be a primary factor in the development of IBS. Parasympathetic and sympathetic nervous branches are present in the digestive tract, regulating secretion and movement through the digestive tract via the enteric plexus [12]. Stress, and other psychological factors, can alter the balance between sympathetic and parasympathetic control, resulting in a persistent increase in the activation of the sympathetic nervous system and a decrease in parasympathetic activity. This persisting imbalance could trigger symptoms of IBS [13, 14].

Clinically, the severity of IBS is determined based on evaluation of the following factors: frequency of abdominal pain, distension, bowel habits, and the effect of the symptoms on quality of life. According to the Irritable Bowel Syndrome Severity Scoring system–Korean Version (IBS-SSS), IBS has been divided into mild, moderate, severe. Patients with mild IBS can usually self-manage their condition, being otherwise in good health and enjoying a good health-related quality of life [15]. However, as the severity of symptoms increases, patients experience lasting discomfort, which negatively affects their quality of life [16]. Frequent onsets of bowel symptoms and persisting, high intensity, pain usually require medical attention, including management of the effects of symptoms on affective well-being in the absence of specific blood tests and pathological indices of IBS, and of the lack of a standardized evidence-based treatment [17], the severity in IBS informs treatment planning and provides a measure of the effectiveness of interventions [18].

In their study on the risk factors for IBS in nurses, Liu *et al*. [19] reported physical activity, performed for 30 min, three or more times per week, to be effective in relieving abdominal distension and pain, thereby lowering the risk for developing IBS. Costanian *et al*. [20] further reported the benefits of physical exercise on stress management, providing a further protective effect against IBS. By comparison, habits of skipping breakfast and irregular eating habits were identified as predisposing factors to the onset of IBS symptoms [21, 22]. Therefore, as physical exercise, dietary habits and affective factors impact on the development and severity in IBS [9, 23], a comprehensive approach to IBS management should include psychological and life-habit intervention in combination with treatment for the relief of moderate-to-severe IBS [11].

Yet, current knowledge on best practice for therapeutic intervention is fragmented, with studies needed to further investigate the associations between irritable bowel syndrome severity, eating habits, exercise, and affective well-being. Therefore, the general goal of our study was to evaluate the severity of bowel symptoms in college female nursing students with IBS, and to explore predictors of IBS symptom severity. Outcomes will form the basis for development of interventions to assist college female nursing programs in managing the severity of their bowel symptoms and to prevent, as possible, the development of IBS.

1.2. Purpose

The specific aims of our study were to investigate differences in the general characteristics of female nursing students who have mild IBS, compared to students with moderate-to-severe IBS; differences in the affective well-being of students who have mild IBS compared to students with moderate-to-severe; and to identify predictors of the severity in IBS.

2. Methods

2.1. Study Design

We conducted a descriptive study of second-year college female nursing students, recruited from six universities located in D city, South Korea. A self-report diagnostic

survey, the Rome III IBS questionnaire, was provided to 807 prospective students to identify those with mild-to-severe bowel symptoms associated to IBS. From this survey, 225 students were identified as meeting our inclusion criteria, with 140 of these students providing informed consent.

2.2.Participants

A power analysis was calculated using G*Power 3.1. Based on the variability in scores of the measurement scales used, data from 119 individuals would be necessary for the bivariate logistic regression analysis to achieve an effect size of 0.15, a level of significance of 0.05, and a statistical power of 0.95 for 3 independent variables. Assuming a 20% non-response rate, a total of 140 individuals were recruited. Review of questionnaires identified 5 questionnaires with incomplete responses; therefore, the data of 135 questionnaires was used in the analysis.

2.3. Instruments

2.3.1. Rome III Adult Questionnaire: The Rome III Adult IBS Questionnaire, developed by Drossman *et al*. [24], translated by the Korean Society for Neurograstroenterology and Motility, was used for the identification of students with IBS. Translation of the questionnaire was provided by the Korean Society of Neurogastroenterology and Motility [25]. The Rome III Questionnaire uses the following questions to determine the severity of IBS symptoms: persistence of symptoms for 2-3 days/month in the previous 3 months (question 1), persistence of symptom over the non-menstrual period (question 2), and persistence of symptoms for ≥6 months (question 3). The criteria in questions 1-3 should be associated with two or more of the following: symptom relief with defecation (question 4); a change in stool frequency (questions 5-6); and change in symptoms accompanying change in the form (appearance) and hardness of stool (questions 7-8).

2.3.2. Affective Well-Being: Affective well-being was measured using the Affective Well-being Measure Scale developed by Diener *et al*. [26] and translated by Woo and Yun in Korea [27]. This instrument measures subjective feelings of positive and negative emotions, using a 5-point Likert scale, with anchors at '1', 'very rarely or never felt', and '5; 'very often or always felt'. Reverse coding was used for questions 2, 4, 6, 8, 9, and 11 of the scale, related to negative emotions, and the total score summed. The total score can vary between 12 and 60 points, with a higher score indicative of higher affective well being. In a study by Diener et at. [26], a Cronbach's α of .81-.89 was calculated for the Well-being Measure Scale, with a Cronbach's á of.82 calculated for our study.

2.3.3. Irritable Bowel Syndrome Severity: The severity of IBS symptoms was measured using the Irritable Bowel Syndrome Severity Scoring system–Korean Version (IBS-SSS), developed by Francis *et al*. [15]. This scoring system is comprised of questions regarding abdominal pain, abdominal distension, bowel habits, and the impact of IBS symptoms on quality of life. Each section is scored on a scale of 0-100 points, with the total score ranging between 0 and 500. The scores are sub classified as follows: a score of 75-174 is indicative of mild IBS; a score of 174-299 of moderate IBS; and a score of 300-500 of severe IBS [17]. In our study, we combined participants with moderate and severe scores into one group. Therefore, participants were classified into two groups for analysis: a group with a Mild IBS and a group with a Moderate-to-Severe IBS.

2.4. Procedure

Data collection was performed between March 4 and 20, 2015, with the investigators working collaboratively with the nursing department and directors of six universities in city D, South Korea. Self-reported questionnaires were provided to students identified with IBS, based on the ROME III Adult questionnaire, during a non-class time. Completion of the questionnaire required about 15 min, and completed questionnaires were immediately collected by the investigators and two research assistants.

2.5. Ethics Approval

The methods of our study were approved by the institutional review board of Kyungpook National University (2015-0017).

2.6. Data analyses

All data analyses were performed using IBM SPSS Statistics 20.0 program. The general characteristics of the study group were described using frequency and percentage, except for the affective well-being score that was reported as a mean ± standard deviation (M±SD). Between-group differences in general characteristics were evaluated using chi-squared analysis and Fisher's exact test, with t-test used to compare affective well-being score. A bivariate logistic regression analysis was conducted to identify predictors of the severity of symptoms of IBS. The adjusted odds ratio (AOR) was calculated for identified predictor variables.

3. Results

3.1. General Characteristics of Subjects

Characteristics of our study group are listed in Table 1, with relevant characteristics summarized as follows: 69.6% of participants were under the age of 20 years; 58.5% did not identify with a specific religion; 48.1% consumed alcohol 1-2 times per month; 27.4% of participants performed physical activity ≥4 times per month, with the other 47.4% not performing any physical activity; 54.6% of participants reported irregular eating habits; and 28.9% used prescription drugs to manage their bowel symptoms on less than three occasions in the previous three months, with the other 63.0% not using any prescription drugs (Table.1).

Table 1. General Characteristics of Subjects   (N = 135)

Characteristics		Total
		N (%)
Age (years)	≤20	94(69.6)
	21～25	34(25.2)
	≥ 26	7(5.2)
Religion	Yes	56(41.5)
	No	79(58.5)
Alcohol (time/month)	None	15(11.1)
	1-2 times /Month	65(48.1)

	3 times or more /Month	55(40.8)
Exercise (time/month)	4 times or more /Month	37(27.4)
	1-3 times /Month	34(25.2)
	None	64(47.4)
Regularity of Meals	Irregular	61(45.2)
	Regular	74(54.6)
Use of drugs in previous 3 months	None	85(63.0)
	Less than 3 times	39(28.9)
	3 times or more	11(8.1)

Notes: Mild, mild bowel symptoms; MTS, moderate-to-severe bowel symptoms; IBSS, irritable bowel syndrome symptom group; †, Fisher exact test

3.2. Comparison of Affective Well-Being Scores and Between-group Comparison

Affective well-being scores are reported in Table 2. A significant between-group difference in affective score (t=4.718, $p<.001$) was identified, with a mean ± SD score of 43.23±6.44 for the mild IBSS group, compared to 38.42±5.32 for the moderate-to-severe IBSS group (Table.2).

Table 2. Comparison of Affective Well-Being Scores and Between-Group Comparison (N = 135)

Variables	Total	Mild IBS 69 (51.1%)	MTS IBS 66 (48.9%)	t	p
	M ± SD	M ± SD	M ± SD		
Affective well-being score	40.88±6.37	43.23±6.44	38.42±5.32	4.718	<.001

Notes: Mild, mild bowel symptoms; MTS, moderate-to-severe bowel symptoms; IBSS, irritable bowel Syndrome symptom group

3.3. Between-group Comparison of General Characteristics of Subjects

The overall prevalence of college female nursing students with IBS, as defined by an IBS-SSS of 174 or greater, was 48.9%. Exercise and regularity of meals were associated with the severity of IBS symptoms ($p < .005$). Exercising ≥4 times/month (15.9% vs. 39.4%, $\chi^2 = 9.961$, $p = 0.006$) and irregular meals (29% vs. 62.1%, $\chi^2 = 14.954$, $p = .001$) increased the likelihood for moderate-to-severe IBS symptoms (Table.3)

Table 3. Between-Group Comparison of General Characteristics of Subjects (N = 135)

Characteristics		Mild IBS (n=69) (51.1%)	MTS IBS (n=66) (48.9%)	χ^2	p
		N (%)	N (%)		
Age (years)	≤20	48(69.6)	46(69.7)	.303†	.911
	21～25	16(26.1))	16(24.2)		
	≥ 26	3(4.3)	4(6.1)		
Religion	Yes	29(42.0)	27(40.9)	.017	.895
	No	40(58.0)	39(59.1)		
Alcohol (time/month)	None	8(11.6)	7(10.6)	.157	.969
	1-2 times /Month	34(49.3)	31(47.0)		
	3 times or more /Month	27(39.1)	28(42.4)		
Exercise (time/month)	4 times or more /Month	11(15.9)	26(39.4)	9.961	.006
	1-3 times /Month	22(31.9)	12(18.2)		
	None	36(52.22)	28(42.4)		
Regularity of Meals	Irregular	20(29.0)	41(62.1)	14.954	.001
	Regular	49(71.0)	25(37.9)		
Use of drugs in previous 3 months	None	47(66.1)	38(57.6)	1.936	.399
	Less than 3 times	18(26.1)	21(31.8)		
	3 times or more	4(5.8)	7(10.6)		

Notes: Mild, mild bowel symptoms; MTS, moderate-to-severe bowel symptoms; IBSS, irritable bowel syndrome symptom group; †, Fisher exact test

3.4. Predictors of the Irritable Bowel Syndrome Severity

The results of the bivariate logistic regression analysis, used to identify predictors of the severity in IBS, are presented in Table 3. The model fit was evaluated, with the chi-squared value of 46.901 and significance level of $p < .001$ being indicative of the goodness-of-fit of the model. The model identified exercise ≥4 times/month as a factor increasing the likelihood of moderate-to-severe IBS (AOR, 4.72; CI: 1.67-13.36). Irregular meals were associated with an increased likelihood of at least moderate IBS (AOR, 4.55; CI: 1.96-10.57). With regards to affective well being, higher scores, indicative of higher well being, were associated to a lower likelihood of moderate-to-severe IBS (AOR, .85; CI: .79-.92). Therefore, exercise frequency ≥4 times/month, irregular meals and low level of affective well-being were predictive of a higher likelihood of moderate-to-severe IBS in college female nursing students.

Table 4. Predictors of the Irritable Bowel Syndrome Severity (N=135)

Predictor Variable	Adjusted Odds Ratio	95% CI		p
Exercise (Reference: none)				
≥4 times/month	4.72	1.67	13.36	.003
1-3 times/month	.62	.23	1.66	.351
Regularity of meals (Reference: regular)				
Irregular	4.55	1.96	10.57	<.001
Affective well-being	.85	.79	.92	<.001
Constant	8.463	2.096	16.303	<.001
-2 Log likelihood	140.182			
χ^2	46.901 (p<.001)			
Cox & Snelle R^2/Nagelkerke R^2	.293 /.391			
Predicted group membership	72.6			

4. Discussion

In our cross-sectional descriptive study of 135 second year college students in nursing, we identified three primary factors predictive of the severity in IBS: exercise at a frequency ≥4 times per month, irregular meals and low affective well-being.

Our results conflict with a previous report by Lim [28] that identified a higher incidence of bowel symptoms in high school students participating in less physical activity time. On the other hand, other studies have a reported a delay in gastric emptying of food and an increase in colon motility after vigorous exercise, which would exacerbate bowel symptoms [10, 29]. Furthermore, Simren *et al*. reported vigorous exercise to act as a stress factor in IBS [29]. In our multivariate analysis, a frequency of exercise ≥4 times per month was associated with an increase in the severity of symptoms. As our study group was relatively small, future studies are needed to fully evaluate the association between exercise and severity in IBS, including the type and volume of exercise (i.e., frequency and intensity), and to systematically compare outcomes across studies.

The severity in IBS was more likely to be moderate-to-severe in students having irregular meals. Lee [30] reported meal frequency and overeating as dietary habits that were risk factors for IBS. Lee *et al*. [31] further reported that the combination of stress, irregular meals, and nighttime snacking to be a provocative factor for IBS. The study by Sung [32] confirmed gastrointestinal symptoms to be associated with patients' eating and dietary habits, supporting our findings of a need to inform students about the importance of healthy eating habits.

Our outcomes identified an association between higher affective well-being scores and a lower likelihood of moderate-to-severe bowel symptoms. Negative emotions, such as

anxiety, depression, and somatization, are commonly associated with IBS [19]. In particular, depression has negative effects on bowel symptoms. Previous studies have demonstrated the effectiveness of reducing negative emotions, including anxiety and depression, to improve bowel symptoms in nurses and a general population of adults [19, 22, 33]. Our results are, therefore, consistent with previously published data.

Our findings of predictive indicators of the irritable bowel syndrome severity in female nursing students in college, namely exercise frequency ≥4 times per month, irregular meals and low affective well-being score, provide the foundation for the design and implementation of education interventions to ameliorate the health of these students. However, as we recruited our study group using convenience sampling, the results of our study cannot be generalized to all female college students in nursing programs, or to the general population of young female adults.

5. Conclusion

In this study, we provided evidence of an association between moderate-to-severe IBS in college female nursing students and greater amounts of exercise (≥4 sessions per month), irregular meals, and low scores of affective well being. Future studies with a larger study cohort are warranted to confirm sensitivity and specificity of predictors identified, as well as to identify other contributing factors. Outcomes of our study do confirm the need to develop and implement intervention programs to reduce the incidence and severity of IBS in female students in programs of nursing at college.

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