



# The Degree of Disease Knowledge in Patients with Gastroesophageal Reflux Disease: A Multi-center Prospective Study in Korea

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## Background/Aims

Patient education has been shown to be beneficial in several diseases. To properly educate patients with gastroesophageal reflux disease (GERD), it is necessary to understand how much they already know about their disease. However, no study has examined the degree of disease knowledge in Korean patients with GERD. Therefore, we conducted this study to assess the degree of knowledge in such patients.

## Methods

This multicenter prospective study was conducted from January 2014 to January 2015. A total of 746 patients (mean age, 52 years; 57.6% female) were enrolled from 7 hospitals in Korea. Inclusion criteria were diagnosis of GERD and ability to properly complete a survey. Degree of disease knowledge was assessed using the translated, validated Korean Urnes questionnaire, which consists of 22 items related to GERD.

## Results

Mean percentage of correct answers was 46.3% and mean GERD knowledge score was 9.6. Degree of knowledge (mean percentage of correct answers) regarding etiology, prognosis, and treatment of GERD were 49.5%, 36.7%, and 37.5%, respectively. Degree of disease knowledge differed significantly according to age ( $P < 0.001$ ), education ( $P < 0.001$ ), income ( $P = 0.028$ ), and occupation ( $P < 0.001$ ). In multivariate analysis, using multiple logistic regression, the higher knowledge score group tended to have higher education and professional occupation.

## Conclusions

The surveyed Korean patients had relatively low disease knowledge, suggesting that a GERD educational program may be beneficial in Korea. Formulation of a program is underway.

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## Key Words

Gastroesophageal reflux; Knowledge; Korea; Surveys and questionnaires

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## Introduction

Prevalence of gastroesophageal reflux disease (GERD) and incidence of its complications have increased remarkably over the last few decades. There is evidence of ethnic variation in GERD<sup>1</sup>: overall prevalence of GERD is reported to be 10% to 20% in Western countries,<sup>2-4</sup> but only 2.5% to 8.5% in Asian countries.<sup>5-7</sup> However, recent studies have shown increasing prevalence of GERD in Asia countries.<sup>8</sup> In South Korea, the recent prevalence of GERD was 7.1%.<sup>9</sup> Patient education has been shown to be beneficial in some chronic diseases.<sup>10-14</sup> Evaluation of a patient education program related to GERD found improvement in quality of life in patients who had completed primary school, but not in patients who had advanced education.<sup>15</sup> In order to properly educate patients with GERD, it is necessary to understand how much they already know about their disease. However, no study has examined the degree of disease knowledge in Korean patients with GERD. Therefore, this study was conducted to assess the degree of disease knowledge in such patients, with the aim of developing a meaningful GERD educational program.

## Materials and Methods

From January 2014 to January 2015, we conducted a prospective survey of 746 Korean patients with GERD aged 15 to 91 years in order to assess their degree of disease knowledge. This study was conducted by the GERD study group of the Korean Society of Neurogastroenterology and Motility, which includes members from multiple centers in South Korea. The study was approved by the institutional review boards of the 7 hospitals that were involved. All of the patients enrolled voluntarily and provided written informed consent for participation. For study inclusion, patients had to be diagnosed as having GERD, which was defined as follows: (1) typical GERD symptoms dominated by heartburn and/or acid regurgitation; (2) positive response to proton pump inhibitor administration; and/or (3) diagnosis of erosive reflux disease based on upper endoscopic examination. Exclusion criteria were lack of consent and inability for any reason to complete the survey. The structured survey was composed of 2 sections: demographics and GERD knowledge. The GERD knowledge section consisted of 22 statements regarding GERD. Degree of disease knowledge was assessed using the translated Korean version (Supplementary Table) of the Urnes' descriptive survey items (Appendix).<sup>16</sup> In the development of the Korean version of the questionnaire, we first asked

for the original author's permission via email. Upon permission, the original instrument was translated, back-translated, and tested for reproducibility using a sample of patients and nurses. The original author validated the translated version. Respondents answered each statement as "true," "false," or "don't know." GERD knowledge score was the sum of correct responses (range 0-22). We also surveyed the overall knowledge of patients with GERD by using a questionnaire consisting of closed-ended questions.

## Statistical Methods

Clinical and sociodemographic variables were analyzed using SPSS 17.0 (IBM Corp, Armonk, NY, USA). Associations between disease knowledge and sociodemographic variables at baseline were analyzed based on bivariate correlations. Associations involving parametric data were assessed using the Student's *t* test, while dichotomous nonparametric data were assessed using the Chi-square test or Fisher's exact test. Multivariate analysis was performed using the variables associated with high disease knowledge in univariate analysis ( $P < 0.05$ ). Odds ratios (ORs) were presented together with 95% confidence intervals (CIs). *P*-values of  $< 0.05$  were considered statistically significant.

## Results

### Patient Characteristics

Table 1 summarizes the baseline characteristics of the patients. A total of 746 patients completed the survey, which was administered onsite at 7 hospitals in Korea. Mean age of the patients was

**Table 1.** Baseline Characteristics of Patients with Gastroesophageal Reflux Disease

Age (median age [range], yr)	52 (15-91)
Gender (n [%])	
Male	316 (42.4)
Female	430 (57.6)
Education (n [%])	
≤ High school	447 (59.9)
≥ College	299 (40.1)
Monthly income (n [%], \$)	
< \$3000	443 (59.4)
\$3000-\$6000	261 (35.0)
> \$6000	42 (5.6)
Occupation (n [%])	
Employed	392 (52.6)
Housewife	233 (31.2)
Unemployed or retired	121 (16.2)

52 years (range, 15-91 years), and 57.6% were female. Regarding education, 447 patients (59.9%) had not completed college, while 299 (40.1%) had completed college. Regarding income, 443 (59.4%) earned less than \$3000 per month, while 42 (5.6%) earned more than \$6000 per month. A total of 392 patients (52.6%) had a professional occupation, 233 (31.2%) were housewives, and 121 (16.2%) were retired or unemployed.

### Closed-ended Questionnaire Results

Many patients reported an interest in learning about medical or nonmedical treatment and etiology of GERD (Table 2). Many patients also reported that they knew about GERD from a physician, internet, television, or brochure, with these sources of information regarded as being the most important to obtain knowledge of GERD.

### Gastroesophageal Reflux Disease Knowledge Test Results

Mean percentage of correct answers was 46.3% (Table 3).

### Symptoms and etiology

Twenty-two percent of patients correctly believed that bloating

**Table 2.** Answer for Closed-ended Questionnaire on Gastroesophageal Reflux Disease

	Number of multiple responses
What do you want to know about GERD?	
Etiology	252
Diagnostic method	65
Medical treatment	179
Non-medical treatment	243
Prognosis	116
From where did you first hear about GERD?	
Television	130
Newspaper	20
Magazine	5
Internet	156
Other patients	47
Physician	384
Brochure	101
Which method do you think is the best to obtain GERD information?	
Television/internet/radio	83
Newspaper	15
Magazine	3
Physician	376
Brochure	252

GERD, gastroesophageal reflux disease.

**Table 3.** Knowledge Degree of Gastroesophageal Reflux Disease in Subjects

Questions	Correct answer, n (%)
Bloating is a symptom in reflux disease	False, 165 (22)
Cough may be a symptom of reflux disease	True, 304 (40)
Difficulties with swallowing may occur in reflux disease	True, 379 (50)
Which of the following occurs during an episode of reflux?	
The sphincter muscle between the stomach and the esophagus relaxes	True, 348 (46)
The esophagus tightens	False, 193 (25)
Acid leaks from the stomach into the esophagus	True, 489 (65)
The production of bile increases	False, 142 (19)
Small meals will often increase reflux	False, 321 (43)
Fatty foods will often increase reflux	True, 452 (60)
Coffee will often aggravate reflux	True, 559 (75)
Late night meals may stimulate reflux	True, 593 (79)
Bending forwards may worsen reflux	True, 321 (43)
Nervousness is a cause of reflux disease	False, 70 (9)
Sedatives are an important treatment in reflux disease	False, 215 (28)
Medicine stimulating intestinal motility is used against reflux disease	True, 199 (26)
Acid production inhibitors are used against reflux disease	True, 417 (56)
Reflux may inflict ulcer in the esophagus	True, 497 (66)
Reflux may inflict ulcer in the stomach	False, 124 (16)
Constriction of the esophagus may occur as a consequence of reflux	True, 310 (41)
Reflux disease may lead to heart disease	False, 205 (27)
Blood tests may be used to prove a diagnosis of reflux	False, 237 (32)
Gastroscopy is an important investigation in reflux disease	True, 650 (87)

is not a symptom of reflux disease, 50% correctly believed that difficulty swallowing may occur in reflux disease, 63.1% falsely believed that nervousness is a cause of reflux disease, and only 9% answered all of these items correctly. Regarding GERD exacerbating factors, 60%, 75%, and 79%, respectively, correctly believed that fatty foods, coffee, and late night meals may exacerbate reflux.

## Management

Twenty-eight percent of patients correctly believed that sedatives are not an important treatment for reflux disease, while 56% correctly believed that acid production inhibitors are used for management of reflux disease.

## Prognosis

Sixty-six percent of patients correctly believed that serious heartburn can lead to esophageal ulcers, whereas 84% falsely believed that reflux may cause ulcers in the stomach. Twelve percent of patients falsely believed that serious heartburn can lead to heart disease, whereas only 27% knew that this association does not exist.

**Table 4.** Sociodemographic Characteristics Between Higher Score Group and Lower Score Group

Variables	Score $\geq$ 9.6 (n = 386)	Score < 9.6 (n = 360)	P-value
Mean age (yr) <sup>a</sup>	50.4	54.1	< 0.001
Sex (M:F) <sup>b</sup>	157:229	159:201	0.335
Education <sup>b</sup>			< 0.001
Elementary	35	48	
Middle school	52	70	
High school	111	131	
College	188	111	
Monthly income <sup>b</sup>			0.028
< \$3000	216	227	
\$3000-\$6000	141	120	
> \$6000	29	13	
Occupation <sup>b</sup>			< 0.001
Housewife	115	118	
Seller	14	23	
Administrator	35	32	
Profession	106	43	
Service worker	38	31	
Agriculture	9	20	
Engineer	5	10	
Simple worker	8	9	
Soldier	3	6	
Unemployed or retired	53	68	

<sup>a</sup>Independent t test (or Student's t test).

<sup>b</sup>Pearson's Chi-square test.

## Factors associated with disease knowledge

Most patients (87%) were correct in identifying gastroscopy as an important investigation in reflux disease. The statement with the lowest correct answer rate (9%) was that nervousness is a cause of reflux disease. Mean GERD knowledge score was 9.6. We then assessed the differences with regard to sociodemographic variables between the higher score group (mean score  $\geq$  9.6, n = 386) and the lower score group (mean score < 9.6, n = 360). Table 4 shows the sociodemographic characteristics between these 2 groups. Degree of disease knowledge differed significantly according to age ( $P < 0.001$ ), education ( $P < 0.001$ ), income ( $P = 0.028$ ), and occupation ( $P < 0.001$ ). In multivariate analysis, using multiple logistic regression, the higher knowledge score group tended to have college education (OR, 1.763; 95% CI, 1.009-3.082;  $P = 0.047$ ) and professional occupation (OR, 2.619; 95% CI, 1.550-4.426;  $P < 0.001$ ) (Table 5).

## Discussion

We conducted this study to investigate the degree of disease knowledge in Korean patients with GERD in order to provide baseline data for formulation of a proper and meaningful GERD educational program in Korea. Increased disease knowledge will not only alert patients regarding symptoms, that may be indicative of GERD, but also make them aware of necessary behavioral changes, including diet, substance use, knowing how to avoid and reduce the severity of symptoms, taking appropriate medications, and seeking professional care at an earlier time.

In this study, the mean percentage of correct answers was 46.3%, and the mean GERD knowledge score was 9.6 (range, 0-22). These findings are lower than those of Urnes et al,<sup>16</sup> who reported a mean GERD knowledge score of 13.1 at 2 months and 14.0 at 12 months in patients allocated to a control group (range, 0-24). These findings may suggest that degree of GERD knowledge in Korea is lower than that of Western countries. However, the present study was relatively large, with 746 patients completing the onsite survey, whereas Urnes et al<sup>16</sup> enrolled only 200 subjects. In addition, concerning the translated questionnaire, differences in culture and language may have influenced the lower GERD knowledge score in Korean patients. Further research is required to explore GERD knowledge in other countries.

The majority of patients correctly answered that fatty foods, late night meals, and coffee may increase reflux. However, 78% falsely believed that bloating is a symptom of reflux disease and 91% falsely believed that nervousness is a cause of reflux disease. These find-

**Table 5.** Result of Multivariable Logistic Regression Analysis of Factors Associated with Disease Knowledge

Variables	B	SE	Odds	95% CI Odds		P-value
				Lower	Upper	
Constant	-0.489	0.288	0.613			0.089
Education						
Elementary			Reference			
Middle school	-0.065	0.294	0.937	0.526	1.668	0.825
High school	0.004	0.271	1.004	0.590	1.706	0.990
College	0.567	0.285	1.763	1.009	3.082	0.047
Occupation						
Unemployed or retired			Reference			
Housewife	0.390	0.234	1.477	0.934	2.335	0.095
Seller	-0.158	0.391	0.854	0.397	1.835	0.685
Administrator	0.208	0.314	1.231	0.665	2.278	0.508
Profession	0.963	0.268	2.619	1.550	4.426	0.000
Service worker	0.489	0.312	1.630	0.884	3.007	0.118
Agriculture	-0.342	0.452	0.710	0.293	1.722	0.449
Engineer	-0.270	0.585	0.763	0.242	2.405	0.645
Simple worker	0.331	0.527	1.392	0.496	3.910	0.530
Soldier	-0.656	0.739	0.519	0.122	2.208	0.375

Variable select method: Stepwise [Forward: Wald].

ings indicate the need for a systematic patient education program including GERD symptoms and aggravating factors. However, according to a previous study, while patient education may increase the degree of disease knowledge, it may not necessarily improve the quality of life of patients with GERD.<sup>15</sup> Nonetheless, that study had a small sample size and lacked a comparison of therapeutic response. Thus, a larger, multicenter study regarding this issue would be valuable.

Regarding the treatment of GERD, approximately 50% of patients knew that acid production inhibitors are used to treat GERD, but only 28% knew that sedatives are not an important treatment for reflux disease, and only 26% knew that prokinetics are used to treat GERD. These findings show that many Koreans have a relatively low degree of knowledge regarding GERD treatment, which, again suggest the need for a systematic patient education program.

Concerning the prognosis of GERD, 66% of patients knew that reflux may lead to esophageal ulcers, and 41% knew that constriction of the esophagus may occur as a consequence of reflux. However, 84% falsely believed that reflux may cause ulcers in the stomach, and 73% falsely believed that reflux disease may lead to heart disease. This lack of knowledge may affect quality of life and cause anxiety in patients with GERD. Proper education could be reassuring and improve quality of life.

Statements with lower correct responses (< 30%) were nervousness is a cause of reflux disease (false), reflux may cause ulcers

in the stomach (false), reflux disease may lead to heart disease (false), bloating is a symptom of reflux disease (false), and reflux may lead to increased bile production and esophageal tightening (false). This lack of disease knowledge may delay subjects from seeking treatment until symptoms become severe.

Differences in disease knowledge were evident with respect to age, income, education, and occupation. These findings will be valuable in formulating a systematic GERD educational program. In this study, we found that the educational program desired by many patients is one in which their physician provides a clear and understandable explanation, and which uses a validated and culturally sensitive questionnaire. It seems that the best setting for GERD education is during medical visits and in the community.

Healthcare providers should also educate patients at routine visits regarding the symptoms and treatment of GERD. Education should include identification of risk factors and triggers, symptoms associated with GERD, dietary and life-style modifications for reducing the severity and frequency of symptoms, use of appropriate medications, and guidelines for seeking care. However, the effectiveness of such a GERD educational program has not yet been demonstrated.

In one prior study, a GERD educational program was useful for increasing disease knowledge, but did not improve quality of life in all patients.<sup>15</sup> For this reason, a well-designed educational program and study in Korea would be valuable.

This study was limited by the use of a questionnaire that was validated after translation; thus, there might be some bias due to differences in language and culture. In addition, we knew that lack of data regarding the characteristics of the enrolled patients would be a limitation in assessing the factors associated with degree of GERD knowledge. A larger study using a self-developed questionnaire might obtain more precise information.

In conclusion, our study is the largest to date that evaluates the degree of disease knowledge in Korean patients with GERD. The mean degree of GERD knowledge in Korea population is lower than that of Western countries. We believe that this study reflects the real status of GERD knowledge in Korean patients. Because prevalence of GERD in Korea has increased to over 7%,<sup>9</sup> there is a pressing need for a meaningful and beneficial GERD educational program. The current data should be valuable in formulating such a program.

## Supplementary Materials

Note: To access the supplementary table mentioned in this article, visit the online version of *Journal of Neurogastroenterology and Motility* at <http://www.jnmjournal.org/>, and at <https://doi.org/10.5056/jnm16123>.

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