

# The Effect of Preparatory Education Program on Discomfort and Retching of Examinees during Upper Gastrointestinal Endoscopy

Ju-Yeon Lee, Min-Whon Anhn, Eun-Tae Kim<sup>1,\*</sup>, Dae-Hyun Kim<sup>1</sup>,  
Hyuk-Jung Kweon<sup>2</sup>, Dong-Yung Cho<sup>2</sup>, Hyung Moon Yoon<sup>3</sup>

Department of Family Medicine, Seoul Red Cross Hospital, Seoul; <sup>1</sup>Department of Family Medicine, Keimyung University College of Medicine, Daegu; Departments of <sup>2</sup>Family Medicine and <sup>3</sup>Orthopaedic Surgery, Konkuk University School of Medicine, Seoul, Korea

**Background:** Although upper gastrointestinal (UGI) endoscopy is highly sensitive for the detection of esophago-gastro-duodenal lesions, pain and discomfort during the procedure cause examinees to experience stress and anxiety. Moreover, there have been only a few studies on relief of pain and discomfort during UGI endoscopy through preparatory interventions. Therefore, the aim of this study was to investigate the relationship between a preparatory education program and the discomfort and retching experienced by examinees during endoscopy.

**Methods:** A total of 306 examinees who visited a health promotion center and underwent non-sedated endoscopy from May 13 to July 3, 2009 were included in this study. After they were assigned to experimental (n = 154) and control groups (n = 152), their discomfort and retching were measured with a visual analogue scale. The preparatory education program consisted of cognitive intervention, behavioral intervention and information.

**Results:** The preparatory education program relieved discomfort during endoscopy in male subjects, in subjects aged 60 and over, or in subjects with previous endoscopic experience with statistical significance (P < 0.05). It also relieved retching during endoscopy in subjects aged 60 and over with statistical significance (P = 0.023). Multiple logistic regression analysis showed that the preparatory education program significantly relieved the discomfort of examinees during endoscopy (P = 0.028).

**Conclusion:** We found that the preparatory education program used in this study could significantly relieve the discomfort caused by endoscopy, particularly in subjects aged 60 and over, or in male subjects with a high incidence of stomach cancer in Korea.

**Keywords:** Preparatory Education; Program; Endoscopy; Anxiety

Received: August 31, 2009, Accepted: April 17, 2012

\*Corresponding Author: Eun-Tae Kim

Tel: 82-54-770-9465, Fax: 82-54-770-9544

E-mail: ket001@kma.org

Korean Journal of Family Medicine

Copyright © 2012 The Korean Academy of Family Medicine

© This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0>) which permits unrestricted noncommercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

## INTRODUCTION

The 2008 annual report for the Korea national cancer registry stated that stomach cancer had the highest overall cancer incidence. According to sex, stomach cancer was the most common cancer in males, and the third most common cancer (after thyroid and breast cancer) in females.<sup>1)</sup> The 2006 annual report on causes of death from Statistics Korea showed that the

cancer death rate was 137.5 per 100,000 populations and the stomach cancer death rate (21.5 per 100,000 populations) was the third highest after lung (29.1 per 100,000 populations) and liver (22.7 per 100,000 populations). However, when compared with the 2005 annual report on causes of death from Statistics Korea, the colon cancer death rate increased the most (0.8 per 100,000 populations) and the stomach cancer death rate dropped the most (-0.4 per 100,000 populations).<sup>2)</sup>

Maruyama<sup>3)</sup> reported that for advanced gastric cancer, the five-year survival rate after surgical resection was 20% to 40% but for early gastric cancer, it was as high as 80% to 90%. As such, since there is a significant difference in death rate between early and advanced gastric cancers, early detection of stomach cancer is believed to have contributed to the decline in the stomach cancer death rate. Therefore, the national cancer screening program recommends that all populations aged 40 and over should undergo an upper gastrointestinal (GI) endoscopy or upper gastrointestinal series biennially, and a lifetime health monitoring program revised in 2003 recommends that men aged 40 and over and women aged 50 and over should undergo an upper GI endoscopy or upper gastrointestinal series biennially.<sup>4)</sup>

The screening rate for stomach cancer in Korea increased about 1.4 fold from 39.2% in 2004 to 53.5% in 2008. However, younger populations did not take a screening examination because they had no time and older populations did not because they worried about having cancer and experiencing pain and discomfort during the endoscopic screening.<sup>5)</sup> It has been known that anxiety, a negative effect, and loss of self-confidence perceived by examinees before an endoscopy, have a negative influence on tolerance, especially in older populations.<sup>6,7)</sup>

To reduce anxiety and the negative affect elicited by the impending upper GI endoscopy, and encourage self-confidence, various preparatory education programs have been developed. These programs are divided into three categories as follows: 1) cognitive interventions are designed to alter patients' perceptions about the procedure and to increase self-confidence;<sup>8)</sup> 2) behavioral interventions are designed to provide patients with a behavior, or set of behaviors, that will enable them to cope better during the procedure (e.g., relaxation techniques, instruction in deep breathing exercises, and rehearsing a behavior that is usually required during endoscopy such as a tongue depressor task and swallowing with an open mouth);<sup>9-12)</sup> and 3) (preparatory)

information provides patients with sensory and procedural information relating to the sensations and sequence of events associated with the endoscopic procedure.<sup>12,13)</sup>

There is a study showing that of these three programs, a combination of cognitive and behavioral interventions could relieve the patients' anxiety effectively.<sup>14)</sup> Abuksis et al.<sup>15)</sup> reported that a pre-endoscopy patient education program apparently increased patient compliance, thereby decreasing both the need for repeated examinations and their attendant costs. Moreover, another study reported that a preparatory education program enabled the subjects to cope better during the endoscopy.<sup>12)</sup>

As mentioned above, many studies in other countries have tried to relieve pre-endoscopic patient anxiety and increase patient compliance during the endoscopic procedure by applying various preparatory education programs. However, there are few studies on preparatory education programs in Korea, even though sedated endoscopy, transnasal endoscopy, or attendance by family members has been tried to relieve the patient's discomfort during upper GI endoscopy.

Therefore, the aim of this study was to investigate the effect of a preparatory education program on the discomfort and retching of examinees during upper GI endoscopy.

## METHODS

---

### 1. Study Participants

Of the 360 examinees who visited a health promotion center in Seoul, Korea, and underwent upper GI endoscopy from May 13 to July 3, 2009, 54 examinees who underwent sedated endoscopy were excluded, and a total of 306 examinees who underwent non-sedated endoscopy were included in this study.

One hundred fifty-four examinees underwent an upper GI endoscopy after the preparatory education program and another 152 examinees underwent an upper GI endoscopy after the usual instruction. The study duration was about 7.4 weeks. The 7.4 weeks were divided into 4 terms at approximately 2-week intervals and randomized as follows: preparatory education (for 13 days), usual instruction (for 13 days), preparatory education (for 14 days), and usual instruction (for 14 days).

## 2. Method

The purpose of this study was explained to each subject by a medical doctor and verbal informed consent was given by each subject prior to the study. The medical doctor collected answers to a questionnaire that included baseline information, past medical history, any previous endoscopic experience, and any discomfort during a prior endoscopy. Before the endoscopy, levels of anxiety and self-confidence were measured in all subjects with a visual analogue scale (VAS). A VAS is a horizontal line, 10 cm in length, anchored by word descriptors at each end and scored from 0 to 10 points. Each end of the VAS was as follows: left end, not anxious or no self-confidence, right end, very anxious, or most self-confidence.

In order to investigate the sequential changes in the anxiety and self-confidence level of examinees before and after the preparatory education program, pre-endoscopic anxiety and self-confidence levels were measured again with the VAS after the preparatory education program. One family medicine specialist and two chief residents performed the upper GI endoscopy and endoscopists were categorized into two types taking into consideration inter-personal variation in endoscopic skills: specialists and residents. The average inspection time and the presence or absence of endoscopic biopsy were checked. Finally, post-endoscopy levels of discomfort and retching were measured just after endoscopic examination using a VAS. The VAS was as follows: left end, very comfortable or no retching; right end, very uncomfortable, or too much retching.

## 3. Preparatory Education Program

The preparatory education program consisted of cognitive intervention, behavioral intervention, and information and presented in the following order: 1) information, 2) behavioral intervention, and 3) cognitive intervention. Only one trained resident performed the preparatory education program through a face-to-face explanation with the subjects to reduce the interpersonal variation. First, the information was presented in the following order: 1) the purpose of upper GI endoscopy, 2) diagnostic value of upper GI endoscopy, 3) internal organs examined by upper GI endoscopy using an atlas of the upper GI tract, 4) expected average inspection times, 5) possible procedures during an endoscopy, and 6) standard position of an examinee during the procedure. Second, the behavioral

intervention consisted of a deep breathing exercise, a tongue depressor task, swallowing technique, and relaxation. The tongue depressor task and swallowing technique were rehearsed at least three times. Finally, the cognitive intervention used an audiotape containing music and narration to encourage the self-confidence of the examinees and relax them. The total duration of the preparatory education program was approximately 10 to 15 minutes.

## 4. Statistical Analysis

All analyses were done with SPSS ver. 16.0 (SPSS Inc., Chicago, IL, USA). To compare the baseline characteristics and endoscopic-related factors between the experimental and control groups, the chi-square test and independent Student t-test were used to analyze categorical and continuous variables, respectively. To evaluate the association between the baseline characteristics and endoscopic-related factors and discomfort and retching during endoscopy, the independent Student t-test and Pearson's correlation coefficient were used. To compare the change in self-confidence and anxiety levels of the examinees between before and after the preparatory education program, a general linear model, repeated measures analysis of variance (ANOVA), was used. Moreover, to evaluate the factors that affect the discomfort and retching of the examinees during endoscopy, logistic regression models were used. Statistical significance was set at a P-value and confidence interval of <0.05 and 95%, respectively.

## RESULTS

### 1. Characteristics of the Study Subjects

A total of 306 subjects consisting of 175 males (57.2%) and 131 females (42.8%) were included in this study. According to age, 120 (39.2%) were 60 years and over; 72 (23.5%) were between 50 and 59 years of age; 75 (24.5%) were between 40 and 49 years of age; 31 (10.1%) were between 30 and 39 years of age, and 8 (2.6%) were between 20 and 29 years of age. As a matter of convenience, the subjects were divided into two groups: a group with subjects aged 60 and over and a group with subjects aged under 60.

The number of subjects with previous endoscopic experience was 276 (90.2%) and without was 30 (9.8%). The average

inspection time of the endoscopy was  $5.83 \pm 2.743$  minutes. One hundred sixteen subjects (37.9%) underwent endoscopic biopsy or the Campylobacter-like organism (CLO) test and the remaining 190 subjects (62.1%) did not.

Between the group with the preparatory education program and the group without the program, there was no statistically significant difference in age, sex, education level, a previous endoscopic experience, endoscopists, the average inspection time of the endoscopy, and endoscopic biopsy, including the CLO test ( $P > 0.05$ ). Moreover, there was also no statistically significant difference in the levels of pre-endoscopic self-confidence and anxiety ( $P > 0.05$ ) (Table 1).

## 2. Factors Affecting Discomfort and Retching Experienced by Examinees during Endoscopy

Of the factors affecting discomfort during endoscopy, there was a statistically significant difference between the presence or absence of the preparatory education program, in the discomfort experienced by examinees during a prior endoscopy, in pre-endoscopic anxiety levels, and in endoscopists ( $P < 0.05$ ). The subjects who received the preparatory education program, reported good tolerance for a prior endoscopy, had lower anxiety compared to the mean level of pre-endoscopic anxiety, or underwent endoscopy performed by a specialist, had significantly less discomfort during the endoscopy ( $P < 0.05$ ). There was a statistically significant correlation between the discomfort during endoscopy and the average inspection time for endoscopy ( $r = 0.168, P = 0.003$ ).

**Table 1.** Baseline characteristics of examinees undergoing upper gastrointestinal endoscopy.

Characteristics		Education	No education	Total	P-value
Gender	Male	85 (55.2)	90 (59.2)	175 (57.2)	0.478
	Female	69 (44.8)	62 (40.8)	131 (42.8)	
Age (y)	20s	3 (1.9)	5 (3.3)	8 (2.6)	0.498
	30s	13 (8.4)	18 (11.8)	31 (10.1)	
	40s	34 (22.1)	41 (27.0)	75 (24.5)	
	50s	40 (26.0)	32 (21.1)	72 (23.5)	
	≥60	64 (41.6)	56 (36.8)	120 (39.2)	
Education level	None & elementary	19 (12.6)	18 (11.8)	37 (12.3)	0.941
	Middle & high school	58 (38.7)	61 (40.1)	119 (39.4)	
	Over college	73 (48.7)	73 (48.0)	146 (48.3)	
Previous endoscopic experience	(+)	140 (90.9)	136 (89.5)	276 (90.2)	0.673
	(-)	14 (9.1)	16 (10.5)	30 (9.8)	
Endoscopist	Specialist	148 (96.1)	144 (94.7)	292 (95.4)	0.567
	Resident	6 (3.9)	8 (5.3)	14 (4.6)	
Procedure duration (min)		$5.59 \pm 2.753$	$6.08 \pm 2.720$	$5.83 \pm 2.743$	0.120*
Endoscopic biopsy (including CLO test)	(+)	54 (35.1)	62 (40.8)	116 (37.9)	0.302
	(-)	100 (64.9)	90 (59.2)	190 (62.1)	
Baseline self-confidence (VAS score)		$7.41 \pm 1.345$	$7.18 \pm 1.620$	$7.30 \pm 1.489$	0.180*
Baseline anxiety (VAS score)		$3.64 \pm 2.186$	$3.81 \pm 2.411$	$3.72 \pm 2.297$	0.535*

Values are presented as number (%) or mean ± SD. Chi-square test.

CLO: Campylobacter-like organism, VAS: visual analogue scale.

\*Independent Student t-test.

Of the factors affecting retching during endoscopy, there was a statistically significant difference in sex, age, the discomfort experienced by examinees during a prior endoscopy, pre-endoscopic anxiety level, and endoscopists ( $P < 0.05$ ), but no significant difference between the presence or absence of the preparatory education program ( $P = 0.130$ ). The subjects who were male, aged 60 and over, reported good tolerance for a prior endoscopy, had lower anxiety compared to the mean level of pre-endoscopic anxiety, or underwent endoscopy performed by a specialist, had significantly less retching during an endoscopy ( $P$

$< 0.05$ ). There was no significant correlation between retching during endoscopy and the average inspection time for endoscopy ( $r = 0.094, P = 0.105$ ).

The education level, pre-endoscopic self-confidence level, the presence or absence of an endoscopic biopsy, and previous endoscopic experience had no statistically significant effect on both discomfort and retching during endoscopy ( $P > 0.05$ ) (Table 2).

**Table 2.** The factors affecting discomfort and retching of examinees during upper gastrointestinal endoscopy.

Characteristics		Discomfort during endoscopy (VAS score)		Retching during endoscopy (VAS score)	
		Mean ± SD	P-value	Mean ± SD	P-value
Preparatory education	Done	3.66 ± 2.452	0.015	3.65 ± 2.421	0.130
	Not done	4.33 ± 2.289		4.06 ± 2.248	
Gender	Male	3.84 ± 2.236	0.182	3.61 ± 2.242	0.037
	Female	4.22 ± 2.574		4.18 ± 2.434	
Age (y)	<60	4.09 ± 2.463	0.417	4.13 ± 2.500	0.010
	≥60	3.86 ± 2.279		3.42 ± 2.008	
Education level	None & elementary	4.49 ± 2.457	0.170*	4.00 ± 2.224	0.066*
	Middle & high school	3.71 ± 2.195		3.47 ± 2.219	
	Over college	4.11 ± 2.510		4.13 ± 2.435	
Discomfort during prior endoscopy	Yes	4.11 ± 2.292	0.017	3.94 ± 2.254	0.044
	No	3.23 ± 2.370		3.20 ± 2.486	
Anxiety prior to preparatory education	Higher than mean	4.52 ± 2.522	0.001	4.45 ± 2.486	0.000
	Lower than mean	3.60 ± 2.193		3.39 ± 2.099	
Self-confidence prior to preparatory education	Higher than mean	3.99 ± 2.358	0.372	3.84 ± 2.330	0.432
	Lower than mean	4.75 ± 3.327		4.50 ± 2.563	
Endoscopist	Specialist	3.92 ± 2.338	0.012	3.79 ± 2.328	0.046
	Resident	5.57 ± 2.980		5.07 ± 2.336	
Endoscopic biopsy (including CLO test)	No	3.88 ± 2.449	0.263	3.87 ± 2.510	0.852
	Yes	4.20 ± 2.288		3.82 ± 2.036	
Previous endoscopic experience	No	3.90 ± 2.724	0.810	3.93 ± 2.528	0.845
	Yes	4.01 ± 2.357		3.85 ± 2.323	
Procedure duration (min)		0.168 <sup>†</sup>	0.003	0.094 <sup>†</sup>	0.105

Independent Student t-test.

VAS: visual analogue scale, CLO: Campylobacter-like organism.

\*One-way analysis of variance. <sup>†</sup>Pearson correlation coefficient.

**Table 3.** The effect of the preparatory education program on relieving the discomfort and retching of examinees during upper gastrointestinal endoscopy according to gender, age, previous endoscopic experience, and endoscopists.

Characteristics		Education (n = 154)	No education (n = 152)	P-value
Self-confidence prior to intervention (VAS score)	Male	7.59 ± 1.303	7.31 ± 1.616	0.219
	Female	7.59 ± 1.372	6.99 ± 1.621	0.454
	Age (y) < 60	7.27 ± 1.473	7.05 ± 1.880	0.392
	Age (y) ≥ 60	7.61 ± 1.121	7.40 ± 1.006	0.289
	Endoscopic experience (+)	7.46 ± 1.347	7.34 ± 1.470	0.504
	Endoscopic experience (-)	6.93 ± 1.269	5.81 ± 2.167	0.102
	Specialist	7.40 ± 1.348	7.27 ± 1.497	0.446
	Resident	7.67 ± 1.366	5.56 ± 2.757	0.114
	Anxiety prior to intervention (VAS score)	Male	3.19 ± 2.145	3.56 ± 2.476
Female		4.20 ± 2.118	4.15 ± 2.291	0.898
Age (y) < 60		4.08 ± 2.193	4.28 ± 2.515	0.564
Age (y) ≥ 60		3.03 ± 2.039	2.99 ± 1.992	0.914
Endoscopic experience (+)		3.55 ± 2.176	3.63 ± 2.291	0.776
Endoscopic experience (-)		4.57 ± 2.138	5.31 ± 2.915	0.440
Specialist		3.61 ± 2.190	3.71 ± 2.358	0.690
Resident		4.50 ± 2.074	5.44 ± 2.933	0.518
Discomfort during endoscopy (VAS score)		Male	3.41 ± 2.213	4.22 ± 2.199
	Female	3.96 ± 2.697	4.50 ± 2.421	0.230
	Age (y) < 60	3.91 ± 2.482	4.25 ± 2.448	0.358
	Age (y) ≥ 60	3.32 ± 2.388	4.47 ± 1.999	0.005
	Endoscopic experience (+)	3.71 ± 2.441	4.31 ± 2.238	0.034
	Endoscopic experience (-)	3.21 ± 2.614	4.50 ± 2.757	0.202
	Specialist	3.57 ± 2.400	4.27 ± 2.228	0.010
	Resident	5.83 ± 2.927	5.38 ± 3.204	0.788
	Retching during endoscopy (VAS score)	Male	3.35 ± 2.209	3.84 ± 2.260
Female		4.00 ± 2.625	4.837 ± 2.212	0.388
Age (y) < 60		4.10 ± 2.520	4.17 ± 2.494	0.856
Age (y) ≥ 60		3.03 ± 2.148	3.87 ± 1.754	0.023
Endoscopic experience (+)		3.60 ± 2.372	4.08 ± 2.257	0.088
Endoscopic experience (-)		4.07 ± 2.915	3.81 ± 2.228	0.785
Specialist		3.59 ± 2.420	4.00 ± 2.223	0.140
Resident		5.00 ± 2.191	5.13 ± 2.588	0.926

Values are presented as mean ± SD. Independent Student t-test.

VAS: visual analogue scale.

### 3. The Effect of a Preparatory Education Program on the Discomfort and Retching during Endoscopy according to Sex, Age, Previous Endoscopic Experience, and Endoscopists

Of the factors affecting discomfort during endoscopy, there was a statistically significant difference in sex, age, previous endoscopic experience, and endoscopists, between the group with the preparatory education program and the group without the program. Particularly, the subjects who were male, aged 60 and over, had previous endoscopic experience, or underwent endoscopy performed by a specialist, had significantly less discomfort during endoscopy by virtue of the preparatory education program ( $P < 0.05$ ).

Of the factors affecting retching during endoscopy, there was a statistically significant difference only in age between the group with the preparatory education program and the group without the program. Particularly, the subjects aged 60 and over had significantly less retching during endoscopy by virtue of the preparatory education program ( $P = 0.023$ ) (Table 3).

To compare the change in the self-confidence and anxiety levels of examinees between before and after the preparatory education program, a general linear model, repeated measures ANOVA, was used in the subjects with the preparatory education program. The pre-endoscopic self-confidence level increased by virtue of the preparatory education program.

Encouraging pre-endoscopic self-confidence through the preparatory education program had no significant difference in sex, previous endoscopic experience, or endoscopists ( $P > 0.05$ ), but a statistically significant difference in age. Particularly, the preparatory education program significantly increased the pre-endoscopic self-confidence level in subjects aged 60 and over ( $P = 0.001$ ). Moreover, the preparatory education program reduced the pre-endoscopic anxiety level, too. The relief of pre-endoscopic anxiety from the preparatory education program had a statistically significant difference in endoscopists ( $P = 0.028$ ), but no significant difference in sex, age, or previous endoscopic experience ( $P > 0.05$ ) (Table 4).

### 4. Factors Affecting Discomfort and Retching during Upper GI Endoscopy Using Multiple Logistic Analyses

To evaluate the effect of the preparatory education program on discomfort and retching experienced by examinees during endoscopy after adjusting for sex and age, discomfort experienced by an examinee during a prior endoscopy, pre-endoscopic anxiety level, endoscopists, and average inspection time of endoscopy, multiple logistic analysis was done and the results showed that the preparatory education program and the pre-endoscopic anxiety level had a statistically significant influence on discomfort during endoscopy ( $P = 0.028$ ,  $P = 0.006$ , respectively). However, the  $R^2$  value, the explanatory power of the logistic regression model,

**Table 4.** Changes in visual analogue scale scores for self-confidence & anxiety before and after the preparatory education program.

Characteristics	Self-confidence pre- and post-education			Anxiety pre- and post-education			
	Self-confidence prior to education	Self-confidence after education	P-value	Anxiety prior to education	Anxiety after education	P-value	
Gender	Male	7.59 ± 1.303	8.52 ± 1.331	0.251	3.19 ± 2.145	2.14 ± 2.153	0.910
	Female	7.19 ± 1.372	7.93 ± 1.443		4.20 ± 2.118	3.12 ± 2.273	
Age (y)	<60	7.27 ± 1.473	7.88 ± 1.498	0.001	4.08 ± 2.193	3.14 ± 2.221	0.183
	≥60	7.61 ± 1.121	8.78 ± 1.080		3.03 ± 2.039	1.78 ± 2.066	
Experience of endoscopy	(+)	7.46 ± 1.347	8.30 ± 1.423	0.852	3.55 ± 2.176	2.51 ± 2.286	0.552
	(-)	6.93 ± 1.269	7.82 ± 1.219		4.57 ± 2.138	3.29 ± 1.826	
Physician	Specialist	7.40 ± 1.348	8.25 ± 1.398	0.818	3.61 ± 2.190	2.59 ± 2.258	0.028
	Resident	7.67 ± 1.366	8.42 ± 1.800		4.50 ± 2.074	2.17 ± 2.317	

Values are presented as mean ± SD. General linear models-repeated measures analysis of variance.

**Table 5.** The factors affecting discomfort and retching of examinees during upper gastrointestinal endoscopy using multiple regression analysis.

Characteristics	Discomfort during endoscopy (VAS)				Retching during endoscopy (VAS)			
	Beta	Standard error	P-value	Model summary R <sup>2</sup>	Beta	Standard error	P-value	Model summary R <sup>2</sup>
Preparatory education	0.612	0.277	0.028	0.113	0.458	0.276	0.099	0.106
Age	-0.031	0.287	0.913		-0.566	0.286	0.049	
Gender	0.319	0.288	0.270		0.527	0.287	0.068	
Physician	0.924	0.749	0.218		0.709	0.747	0.344	
Anxiety prior to education	0.833	0.298	0.006		0.750	0.297	0.012	
Discomfort during previous endoscopy	-0.619	0.365	0.091		-0.508	0.364	0.165	
Procedure duration	0.112	0.059	0.060		0.073	0.059	0.214	

VAS: visual analogue scale.

was 11.3%. Moreover, multiple logistic analysis showed that age and pre-endoscopic anxiety level had a statistically significant influence on retching during endoscopy ( $P < 0.05$ ), but the preparatory education program did not ( $P = 0.099$ ). The  $R^2$  value of the logistic regression model was 10.6% (Table 5).

## DISCUSSION

Upper gastrointestinal endoscopy is a very important and highly sensitive method to detect esophago-gastro-duodenal lesions and is commonly used as a screening test for stomach cancer in asymptomatic populations in Korea and Japan where stomach cancer is highly prevalent.<sup>16,17</sup> However, the investigation and diagnosis of gastrointestinal diseases might be delayed by the discomfort, retching, and anxiety in patients during endoscopy.

To relieve discomfort, retching, and anxiety during endoscopy, ultrathin fiberscopes and transnasal endoscopy have been introduced, and sedated endoscopy is increasingly used. However, these are not commonly used in general hospitals in Korea. Moreover, sedated endoscopy retains the possibility for cardiopulmonary and sedation-related complications.

Therefore, further studies are needed to reduce the discomfort and retching in examinees during upper GI endoscopy and to relieve the pre-endoscopic tension and anxiety of examinees. For this reason, a variety of preparatory education programs have

been studied and developed in other countries, but few in Korea.

The aim of this study was to investigate the factors affecting the discomfort and retching of examinees during upper GI endoscopy and evaluate the effect of preparatory education program on discomfort and retching in examinees during upper GI endoscopy. The significant factors affecting discomfort were the presence or absence of the preparatory education program, the discomfort experienced by examinees during a previous endoscopy, pre-endoscopic anxiety levels, endoscopists, and the average inspection time of the endoscopy. The significant factors affecting retching were sex, age, the discomfort experienced by examinees during a previous endoscopy, pre-endoscopic anxiety levels, and endoscopists.

Multiple logistic analysis showed that the subjects who received the preparatory education program or had lower anxiety compared to the mean pre-endoscopic anxiety level had significantly less discomfort during endoscopy ( $P < 0.05$ ) and the subjects who were aged 60 and over or had lower anxiety compared to the mean pre-endoscopic anxiety level had significantly less retching during endoscopy ( $P < 0.05$ ). However, the preparatory education program had no statistically significant effect on retching during endoscopy ( $P = 0.099$ ).

The published studies have reported that the tolerance of endoscopy was significantly less in younger populations and women.<sup>18-21</sup> Other studies have reported that the following variables were related to poor tolerance: 1) in patients undergoing



an gastroscopy for the first time: presence of a gag reflex, apprehension, young age, and high level of anxiety; and 2) in patients with prior experience: apprehension, poor tolerance for prior examinations and female gender. The above-mentioned tolerance includes ease of intubation, number and severity of retching episodes, and the endoscopist's assessment of the patient's cooperation with the gastroscopy procedure.<sup>22,23)</sup>

These findings are consistent with this study in that the subjects who were male or aged 60 and over had significantly less discomfort during endoscopy and the subjects who were aged 60 and over had significantly less retching during endoscopy by virtue of the preparatory education program. The general linear model, repeated measures ANOVA, showed that the relief of pre-endoscopic anxiety by the preparatory education program had no significant difference in sex, or age, but encouraging pre-endoscopic self-confidence through the preparatory education program was significant and remarkable in the subjects aged 60 and over ( $P = 0.001$ ).

This study has the following limitations. First, this study may not be generalized to the entire population since the study participants were enrolled only in one general hospital. Second, the reliability of the data decreases since the pre-endoscopic anxiety and self-confidence levels and the degree of the discomfort and retching during endoscopy were measured by VAS. VAS is recorded by the subjective perception of the examinees. Third, the protocol of the preparatory education program used in this study was not validated since the preparatory education program is not yet standardized in Korea. Fourth, the explanatory power of the logistic regression model in this study was weak. This is thought to be because the factors affecting discomfort and retching during endoscopy are more than the variables included in this study, for example, the traits of the examinees, family member's attendance during endoscopy, the ambience in the endoscopy room, assessment of endoscopic skills, the degree of stomach distension with air insufflation, etc. Fifth, it is impractical to assign more than ten minutes of the preparatory education program in Korea. Further studies are needed to develop brief preparatory education programs such as video or easy to read information brochures or pamphlets, etc.<sup>24,25)</sup>

In conclusion, this study showed that a preparatory education program could relieve the discomfort and retching experienced by examinees during endoscopy. Particularly, the preparatory

education program was effective in the subjects who were aged 60 and over. The reason might be that it had a significant effect on encouraging pre-endoscopic self-confidence in the subjects aged 60 and over. This finding is very interesting in that stomach cancer occurs most commonly in populations aged 60 and over in Korea. The significant factor affecting both discomfort and retching during endoscopy was only the pre-endoscopic anxiety level. Moreover, this study showed that the preparatory education program could relieve the pre-endoscopic anxiety level. Further studies are needed to develop effective preparatory education programs covering the individual characteristics of all populations.

## CONFLICT OF INTEREST

---

No potential conflict of interest relevant to this article was reported.

## REFERENCES

---

1. Ministry for Health, Welfare and Family Affairs. Annual report of cancer incidence (2005) and survival (1993-2005) in Korea. Seoul: Ministry for Health, Welfare and Family Affairs; 2008.
2. Statistics Korea. Annual report of the cause of death statistics. Daejeon: Statistics Korea; 2007.
3. Maruyama M. Five year survival rate and depth of invasion of cancer the stomach. *Ho Cho* 1978;11:855.
4. The Korean Academy of Family Medicine. Korean society for lifetime health monitoring. rev. ed. Seoul: Gyechuk munwhasa; 2003.
5. The Korean National Cancer Screening Survey in 2008 [Internet]. Goyang: National Cancer Center [cited 2009 Jul 30]. Available from: [http://ncc.re.kr/pr/notice\\_view.jsp?nws\\_id=781](http://ncc.re.kr/pr/notice_view.jsp?nws_id=781).
6. Gattuso SM, Litt MD, Fitzgerald TE. Coping with gastrointestinal endoscopy: self-efficacy enhancement and coping style. *J Consult Clin Psychol* 1992;60:133-9.
7. Jankowski J, Tregaskis B, Jankowski R, Fisher S, Wormsley KG. Anxiety levels before, during and after endoscopy

- [abstract]. *Gut* 1990;31:A613.
8. Hackett ML, Lane MR, McCarthy DC. Upper gastrointestinal endoscopy: are preparatory interventions effective? *Gastrointest Endosc* 1998;48:341-7.
  9. Lembo T, Fitzgerald L, Matin K, Woo K, Mayer EA, Naliboff BD. Audio and visual stimulation reduces patient discomfort during screening flexible sigmoidoscopy. *Am J Gastroenterol* 1998;93:1113-6.
  10. Schnee AD. Effect of psychological preparation on reducing behavioural distress and morbidity in children undergoing endoscopy. *Diss Abstr Int* 1996;56(11B):6406.
  11. Kaplan RM, Atkins CJ, Lenhard L. Coping with a stressful sigmoidoscopy: evaluation of cognitive and relaxation preparations. *J Behav Med* 1982;5:67-82.
  12. Maguire D, Walsh JC, Little CL. The effect of information and behavioural training on endoscopy patients' clinical outcomes. *Patient Educ Couns* 2004;54:61-5.
  13. van Vliet MJ, Grypdonck M, van Zuuren FJ, Winnubst J, Kruitwagen C. Preparing patients for gastrointestinal endoscopy: the influence of information in medical situations. *Patient Educ Couns* 2004;52:23-30.
  14. Brandt LJ. Patients' attitudes and apprehensions about endoscopy: how to calm troubled waters. *Am J Gastroenterol* 2001;96:280-4.
  15. Abuksis G, Mor M, Segal N, Shemesh I, Morad I, Plaut S, et al. A patient education program is cost-effective for preventing failure of endoscopic procedures in a gastroenterology department. *Am J Gastroenterol* 2001;96:1786-90.
  16. Min YI, Kim JH, Hong WS, Geong HY, Myung SJ, Kim KM. Upper gastrointestinal endoscopy ATLAS. Seoul: Kun Ja publishing company; 2004.
  17. Yoo JY, Hahm SK, Chun JY, Lee SH, Cho SH, Park JA. The effect of family member's attendance on relief of patient's discomfort during upper gastrointestinal endoscopy. *J Korean Acad Fam Med* 2008;29:13-9.
  18. Campo R, Brullet E, Montserrat A, Calvet X, Rivero E, Brotons C. Topical pharyngeal anesthesia improves tolerance of upper gastrointestinal endoscopy: a randomized double-blind study. *Endoscopy* 1995;27:659-64.
  19. Froehlich F, Schwizer W, Thorens J, Kohler M, Gonvers JJ, Fried M. Conscious sedation for gastroscopy: patient tolerance and cardiorespiratory parameters. *Gastroenterology* 1995;108:697-704.
  20. Tan CC, Freeman JG. Throat spray for upper gastrointestinal endoscopy is quite acceptable to patients. *Endoscopy* 1996;28:277-82.
  21. Hoare AM, Hawkins CF. Upper gastrointestinal endoscopy with and without sedation: patients' opinions. *Br Med J* 1976;2:20.
  22. Farhadi A, Fields JZ, Hoseini SH. The assessment of esophagogastroduodenoscopy tolerance a prospective study of 300 cases. *Diagn Ther Endosc* 2001;7:141-7.
  23. Campo R, Brullet E, Montserrat A, Calvet X, Moix J, Rue M, et al. Identification of factors that influence tolerance of upper gastrointestinal endoscopy. *Eur J Gastroenterol Hepatol* 1999;11:201-4.
  24. Callaghan P, Chan HC. The effect of videotaped or written information on Chinese gastroscopy patients' clinical outcomes. *Patient Educ Couns* 2001;42:225-30.
  25. Luck A, Pearson S, Maddern G, Hewett P. Effects of video information on precolonoscopy anxiety and knowledge: a randomised trial. *Lancet* 1999;354:2032-5.