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

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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

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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.¹ The 2006 annual report on causes of death from Statistics Korea showed that the
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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).

Maruyama 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.

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. 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.

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; 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); and 3) preparatory information provides patients with sensory and procedural information relating to the sensations and sequence of events associated with the endoscopic procedure.

There is a study showing that of these three programs, a combination of cognitive and behavioral interventions could relieve the patients’ anxiety effectively. Abuksis et al. 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.

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 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 ± 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   | 0.478   |
| Female                                 | 69 (44.8) | 62 (40.8)    | 131   |         |
| Age (y)                                |           |              |       |         |
| 20s                                    | 3 (1.9)   | 5 (3.3)      | 8     |         |
| 30s                                    | 13 (8.4)  | 18 (11.8)    | 31    | 0.498   |
| 40s                                    | 34 (22.1) | 41 (27.0)    | 75    |         |
| 50s                                    | 40 (26.0) | 32 (21.1)    | 72    |         |
| ≥60                                    | 64 (41.6) | 56 (36.8)    | 120   |         |
| Education level                        |           |              |       |         |
| None & elementary                      | 19 (12.6) | 18 (11.8)    | 37    | 0.941   |
| Middle & high school                   | 58 (38.7) | 61 (40.1)    | 119   |         |
| Over college                           | 73 (48.7) | 73 (48.0)    | 146   | 0.483   |
| Previous endoscopic experience (+)     | 140 (90.9)| 136 (89.5)   | 276   | 0.673   |
| (−)                                    | 14 (9.1)  | 16 (10.5)    | 30    |         |
| Endoscopist                            |           |              |       |         |
| Specialist                             | 148 (96.1)| 144 (94.7)   | 292   | 0.567   |
| Resident                               | 6 (3.9)   | 8 (5.3)      | 14    |         |
| Procedure duration (min)               |           |              |       |         |
|                                         | 5.59 ± 2.753| 6.08 ± 2.720| 5.83 ± 2.743| 0.120* |
| Endoscopic biopsy (+)                  |           |              |       |         |
| (including CLO test)                   |           |              |       |         |
| Baseline self-confidence (VAS score)   | 7.41 ± 1.345| 7.18 ± 1.620| 7.30 ± 1.489| 0.180* |
| Baseline anxiety (VAS score)           | 3.64 ± 2.186| 3.81 ± 2.411| 3.72 ± 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†                                 | 0.003                                 | 0.094†                      | 0.105     |

Independent Student t-test.

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

*One-way analysis of variance. †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 | 0.289   |
|                                          | 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 | 0.019   |
|                                          | 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 | 0.157   |
|                                          | Female              | 4.00 ± 2.625           | 4.83 ± 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 R² value, the explanatory power of the logistic regression model,
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 R² 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. 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. Other studies have reported that the following variables were related to poor tolerance: 1) in patients undergoing

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**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 R² | Beta    | Standard error | P-value | Model summary R² |
| 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.
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.22,23)

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.24,25)

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.

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