ORIGINAL PAPER

Comparison of Clinical Features and Patient Background in Functional Dyspepsia and Peptic Ulcer

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Abstract To elucidate the clinical features of functional dyspepsia (FD), patients with FD were compared with patients with peptic ulcer. Fifty-eight FD and fifty-nine peptic ulcer patients were compared with respect to clinical features and patient background. In the FD group, symptoms of dyspepsia, especially upper abdominal fullness and nausea, were more common than in the peptic ulcer group. The FD group complained greater distress (severity of the most distressing symptom; $P < .001$) and showed higher State-Trait Anxiety Inventory (STAI) scores (trait-anxiety score; $P < .05$). A higher proportion of FD patients had consulted another physician ($P < .01$). Even when subjects from the FD and peptic ulcer group in this study were matched for age and gender and compared with respect to these variables, almost the same characteristics were seen. These results indicate that FD markedly decreases quality of life in a variety of aspects.

Keywords Clinical features · Patient background · Functional dyspepsia · Peptic ulcer · Quality of life · State-Trait Anxiety Inventory

Although organic disease has attracted the most attention in the field of gastroenterology, a large group of patients in clinical settings report various long-term gastrointestinal symptoms despite the absence of obvious organic abnormalities. In recent years, the concept of the *functional gastrointestinal disorder* (FGID) has been proposed in an effort to classify these symptoms as an independent disorder [1]. Diagnosis of FGID is based mainly on subjective symptoms, and the impact of FGID on quality of life (QOL) is now receiving attention [2–4].

Dyspepsia is a very common symptom worldwide that when investigated usually leads to 2 diametrically opposite diagnoses: peptic ulcer disease (PUD) and, when no ulcer or other lesion is found, functional dyspepsia (FD), which is 1 type of FGID. PUD and FD, as noted, overlap clinically, but the extent of this overlap and whether there are clinical characteristics that distinguish them remain unclear. For this reason, we prospectively evaluated a number of clinical and psychological characteristics of patients presenting with dyspeptic symptoms and, following diagnosis by upper gastrointestinal endoscopy, compared the variables between the 2 disorders.

Methods

Subjects

Psychological tests were administered to 770 patients (415 men, 355 women; mean age, 48 years) who underwent initial upper gastrointestinal endoscopy at our institute for symptoms of dyspepsia between April 1998 and March 2003. All subjects provided written informed consent to participate in the study. A self-administered questionnaire and the State-Trait Anxiety Inventory (STAI) [5] were used for psychological testing. The investigation compared 58 patients diagnosed with FD according to Rome II criteria [6] following various tests including upper gastrointestinal endoscopy, with 59 patients diagnosed with open peptic ulcer (Table 1).

The FD group (20 men, 38 women; mean age, 40 years) was divided into subgroups based on Rome II

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Table 1 Comparison of demographic and clinical characteristics

	FD group	Peptic ulcer group
n	58	59
Age (years)	40.3 ± 15.3	48.0 ± 14.6*
Men/women	0.53	2.93**
BMI (kg/m^2)	21.3 ± 3.4	21.7 ± 3.0
Smokers (%)	25.0	76.5**
Alcohol use (%)	25.0	64.3**

Values are provided as means ± standard deviation unless otherwise noted.

*$P < .01$;**$P < .001$.

BMI, body mass index.

Table 2 Comparison of demographic and clinical characteristics (subanalysis)

	FD group	Peptic ulcer group
n	28	28
Age (years)	47.0 ± 16.1	47.0 ± 15.6
Men / women	1.15	1.15
BMI (kg/m^2)	22.0 ± 3.8	21.6 ± 2.8
Smokers (%)	27.3	61.0*
Alcohol use (%)	31.8	53.3

Values are provided as means ± standard deviation unless otherwise noted.

*$P < .05$.

BMI, body mass index.

criteria [6]. Symptoms comprised ulcer-like dyspepsia-type symptoms ($n = 25$); dysmotility-like dyspepsia-type symptoms ($n = 23$); and unspecified dyspepsia-type symptoms ($n = 10$). The peptic ulcer group (44 men, 15 women; mean age, 48 years) included 42 patients with gastric ulcer and 17 patients with duodenal ulcer.

Methods

FD and peptic ulcer groups were compared with respect to age, sex ratio, body mass index (BMI: weight/height^2), rates of habitual alcohol consumption and smoking, symptoms, proportion of patients who had consulted another physician for the gastrointestinal disorder, and psychological elements based on STAI score. Regarding symptoms, proportions of patients with each of 5 dyspepsia symptoms (upper abdominal pain, upper abdominal fullness, early satiety, bloating, and nausea) or loss of appetite were compared. Symptoms were investigated in detail by examining how many patients displayed each of these symptoms, and by using the face scale score [7] to determine the severity of the most distressing symptom in each patient. Face scale score was evaluated on a 6-point scale: 0, absence of symptom; 1, slight; 2, mild; 3, considerable; 4, severe; and 5, most severe imaginable. The figure was used to facilitate an understanding of the severity level. The STAI developed by Spielberger *et al.* [5] is a testing method for scoring the levels of state anxiety and trait anxiety based on 20 questions for each anxiety type. State anxiety reflects the current state of anxiety during testing, and trait anxiety reflects innate anxiety, which can be considered an aspect of the personality. When undergoing psychological testing, a cognitive appraisal of the stress associated with testing occurs, and the individual experiences anxiety. Higher STAI scores result in a higher rating on the anxiety scale. The normal level for state anxiety score (STAI-S) is 32–40 for men and 31–41 points for women. The normal level for trait anxiety score (STAI-T) is 33–42 for men and 34–44 points for women. Both the self-administered questionnaire and STAI were administered during the waiting period prior to upper gastrointestinal endoscopy. Furthermore, a correlation between STAI-T score and severity of most distressing symptom, a correlation between STAI-T score and the number of symptom, and a correlation between STAI-T score and the proportion of the patients who had consulted another physician in the FD and peptic ulcer groups were analyzed.

Because the populations in this study were characterized by marked differences in patient background, an investigation that matched the groups for age and gender distribution was conducted in the following subanalysis. Patients from the FD group ($n = 28$) and peptic ulcer group ($n = 28$) matched for age and gender were compared with respect to these variables (Table 2). The FD group was composed of 8 patients with ulcer-like dyspepsia-type symptoms, 14 patients with dysmotility-like dyspepsia-type symptoms, and 6 patients with unspecified dyspepsia-type symptoms. The peptic ulcer group was composed of 18 patients with gastric ulcer and 10 patients with duodenal ulcer.

Statistics

Age and BMI were examined using Student's *t*-test. Sex ratio, alcohol consumption and smoking rate, proportion of patients with the 6 symptoms examined, and the proportion of patients who had consulted another physician for the gastrointestinal disorder were examined using the χ^2 test. The number of patients with each symptom, symptom severity, and STAI score were examined using the Mann–Whitney U-test. Correlations between STAI-T score and severity of the most distressing symptom or the number of symptoms, and the proportion of patients who had consulted another physician were examined using the Spearman's correlation coefficient by rank. A relation between STAI-T score and severity of most distressing symptom in the FD and peptic ulcer groups was examined using the multiple regressions. Values of $P < .05$ were considered statistically significant.
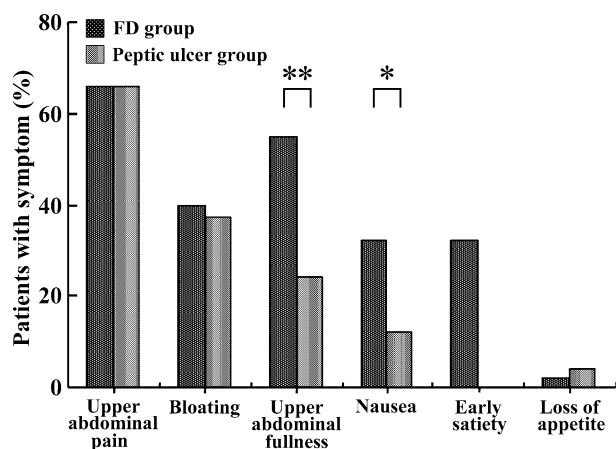
Fig. 1 Proportion of patients with dyspepsia symptoms in the FD and peptic ulcer groups. Upper abdominal fullness and nausea were seen in a significantly greater portion of patients in the FD group than in the peptic ulcer group (*$P < .01$, **$P < .001$).

Results

Patient Background

The FD group comprised relatively younger patients than the peptic ulcer group (Table 2). Mean age was significantly lower in the FD group than in the peptic ulcer group ($P < .01$). The male:female ratio was significantly lower in the FD group than in the peptic ulcer group, with the FD group including more women ($P < .001$). No significant difference was seen between groups in BMI, and most subjects were within normal ranges in both groups. Rate of both habitual smoking and alcohol consumption was 25% in the FD group, significantly lower than in the peptic ulcer group ($P < .001$ for both).

Figure stronges1 shows the proportion of patients with 6 dyspepsia symptoms in the FD and peptic ulcer groups. No significant differences were seen between the groups in the proportion of patients with upper abdominal pain or bloating. Each symptom was high proportion in both groups. Upper abdominal pain was seen in a particularly high proportion of patients in both groups, at $\geq 60\%$. Upper abdominal fullness and nausea were seen in a significantly greater proportion of patients in the FD group than in the peptic ulcer group ($P < .001$ and $P < .01$, respectively). In particular, upper abdominal fullness was frequently seen in the FD group (55%). Early satiety was present in a relatively high proportion of patients in the FD group (32%), but was not seen in any patients in the peptic ulcer group. Appetite loss was present in a small proportion of patients in groups ($\leq 5\%$), and no significant difference between groups was noted. Figure 2 shows the frequency distribution of the number of symptom that patients have among 6 dyspepsia symptoms (upper abdominal pain, bloating, upper abdominal fullness, nausea,

Fig. 2 **a** The frequency distribution of the number of symptom that patients have among dyspepsia symptoms (upper abdominal pain, bloating, upper abdominal fullness, nausea, early satiety and loss of appetite). **b** The severity of the most distressing symptom using face scale. Both the number and the severity of symptom were significantly greater in the FD group than in the peptic ulcer group (*$P < .01$;**$P < .001$). No patient had all 6 symptoms. Face-scale score was evaluated on a 6-pioint scale: 0, absence of symptom; 1, slight; 2, mild; 3, considerable; 4, severe; and 5, most severe imaginable. There was no patient of the scale 0.

early satiety and loss of appetite) (a) and the severity of the most distressing symptom using face scale (b). The number of patients with each symptom and severity of the most distressing symptom were both significantly greater in the FD group than in the peptic ulcer group ($P < .01$ and $P < .001$, respectively). The most distressing symptom was upper abdominal pain (41%) followed by upper abdominal fullness (38%) in the FD group, whereas upper abdominal pain (92%) was the most distressing symptom in the peptic ulcer group. The proportion of patients who had consulted another physician in the FD group was high at 70%, significantly greater than in the peptic ulcer group ($P < .01$; Figure 3).
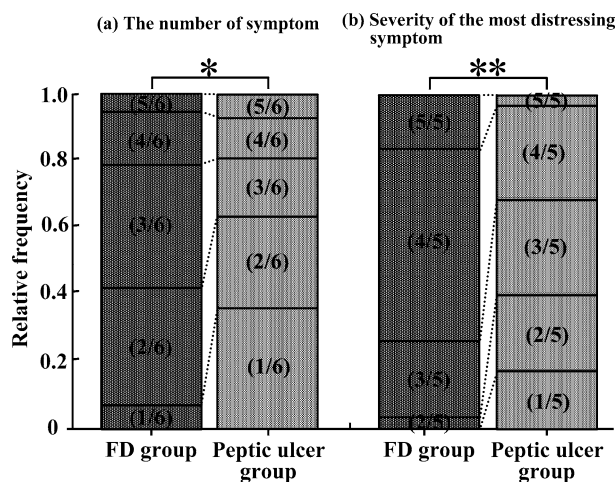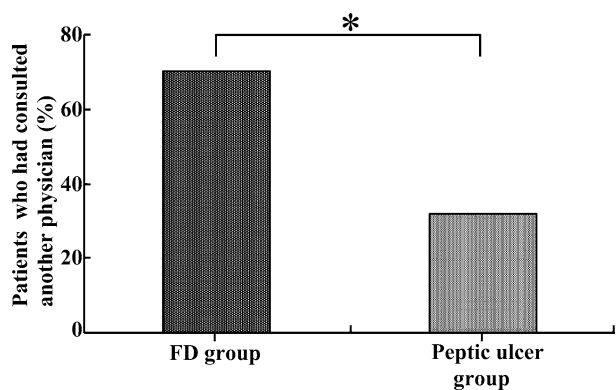

Fig. 3 Proportion of patients who had consulted another physician. The proportion of such patients in the FD group was significantly higher than in the peptic ulcer group (*$P < .01$).
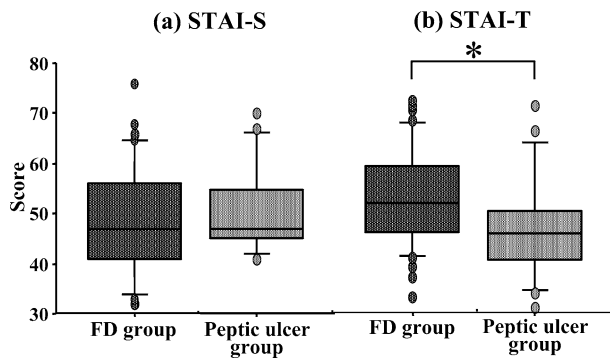
Fig. 4 STAI scores in study 1. STAI-T score was significantly higher in the FD group than in the peptic ulcer group (*P < .05). Mann–Whitney U test. *STAI*, State-Trait Anxiety Inventory, *STAI-S*, STAI-State anxiety, *STAI-T*, STAI-Trait anxiety.

STAI-S score was high in both groups (Figure 4), with no significant difference between groups. Most patients in both groups displayed STAI-S scores above the upper limit of the normal range. STAI-T score was significantly higher in the FD group than in the peptic ulcer group ($P < .05$). Although most patients in the FD group displayed STAI-T scores above the upper limit of the normal range, a relatively high number of patients in the peptic ulcer group showed STAI-T scores in the normal range. From correlation coefficient analyses, STAI-T score and severity of the most distressing symptom, STAI-T score, and the proportion of patients who had consulted another physician in the FD group, and STAI-T score and severity of the most distressing symptom in the peptic ulcer group all showed significantly strong correlation ($P < .01$, $P < .05$, and $P < .05$, respectively, Table 3). Moreover, multiple regressions were performed between STAI-T score and severity of the most distressing symptom in both groups (Table 4), which showed that these 2 factors were well-correlated, and that STAI-T score was significantly higher in the FD group than in the peptic ulcer group.

Table 3 Correlation

	FD group	Peptic ulcer group
STAI-T Severity of the most distressing symptom (Face scale)	$P < .01$	$P < .05$
STAI-T Number of symptoms	$P = .067$	$P = .57$
STAI-T Whether patients had consulted another physician or not	$P < .05$	$P > .99$

STAI-T, State-Trait Anxiety Inventory-Trait anxiety.

Table 4 Multiple regression

	Correlation coefficient	t Value	P-value
Intercept	2.332	4.615	< .0001
STAI-T	0.03	3.204	< .01
Group (FD/peptic ulcer)	− 2.023	− 9.74	< .0001

STAI-T, State-Trait Anxiety Inventory-Trait anxiety.

In the subanalysis, no significant difference was seen between the FD and peptic ulcer groups in patient background (see Table 2). The proportion of patients who habitually smoked was a low 27.3% in the FD group, significantly lower than in the peptic ulcer group ($P < .05$). The proportion of patients who consumed alcohol daily was a relatively low (31.8% in the FD group versus 53.3% in the peptic ulcer group), but no significant difference between groups was identified.

Figure 5 shows the proportion of patients with 6 dyspepsia symptoms in the FD and peptic ulcer groups. No significant differences were seen between the groups in the proportion of patients with upper abdominal pain, bloating, or nausea. Upper abdominal pain in particular was seen in a high proportion of patients in both groups ($\geq 50\%$). Upper abdominal fullness was seen in a high 68% of patients in the FD group, significantly higher than in the peptic ulcer group ($P < .001$). Early satiety occurred in a relatively high proportion of patients in the FD group, but was not seen in any patients in the peptic ulcer group. Appetite loss was not seen in the FD group, and was seen in only 4% of patients in the peptic ulcer group, with no significant difference between groups. Figure 6 shows the frequency distribution of the number of symptom among 6 dyspepsia symptoms (a) and the severity
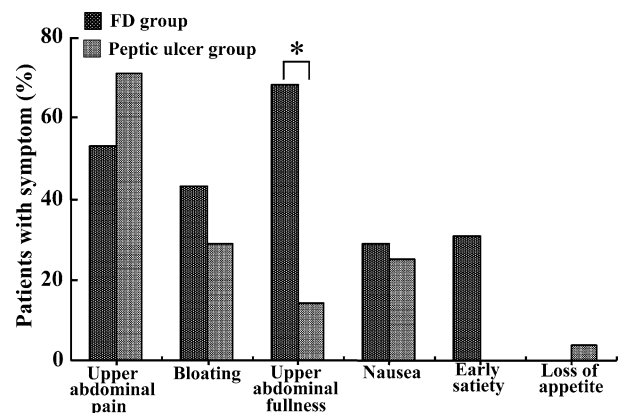

Fig. 5 Proportion of patients with dyspepsia symptoms in the FD and peptic ulcer groups (subanalysis). Upper abdominal fullness was seen in a significantly greater portion of patients in the FD group than in the peptic ulcer group (*P < .001).
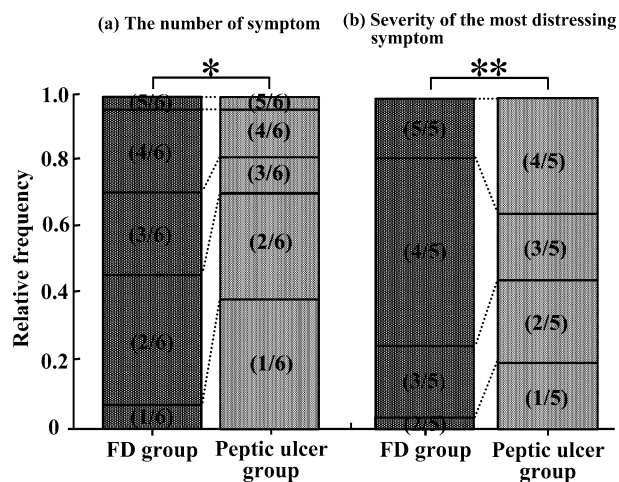
Fig. 6 **a** The frequency distribution of the number of symptom that patients have among (6) dyspepsia symptoms (upper abdominal pain, bloating, upper abdominal fullness, nausea, early satiety and loss of appetite). **b** The severity of the most distressing symptom using face scale. Both the number and the severity of symptom were significantly greater in the FD group than in the peptic ulcer group (*$P < .05$,**$P < .01$). No patient had all 6 symptoms. Face scale score was evaluated on a 6-point scale: 0, absence of symptom; 1, slight; 2, mild; 3, considerable; 4, severe; and 5, most severe imaginable. There was no patient of the scale 0.
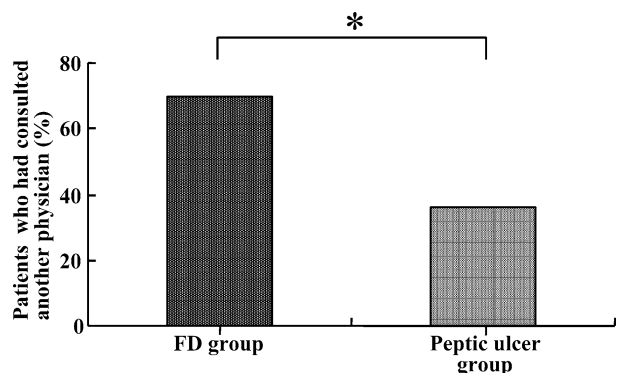

Fig. 7 Proportion of patients who had consulted another physician. The proportion of such patients in the FD group was significantly higher than in the peptic ulcer group (*$P < .05$).

of the most distressing symptom (b). Numbers of patients with each symptom and severity of the most distressing symptom were significantly greater in the FD group than in the peptic ulcer group ($P < .05$ and $P < .01$, respectively). The proportion of patients who had consulted another physician in the FD group was high, at 70%, significantly higher than in the peptic ulcer group ($P < .05$, Figure 7).

STAI-S scores were high in both groups, with no significant differences between groups (Figure 8). Most patients in both groups displayed STAI-S scores above the upper limits of the normal range. STAI-T scores were significantly higher in the FD group than in the peptic ulcer group ($P < .05$). Whereas most of the patients in the FD group displayed STAI-T scores above the upper limit of the normal
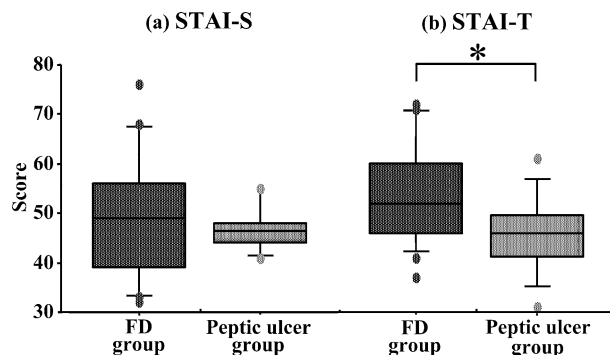

Fig. 8 STAI scores in study 2. STAI-T score was significantly higher in the FD group than in the peptic ulcer group (*$P < .05$). Mann–Whitney U test. *STAI*, State-Trait Anxiety Inventory, *STAI-S*, STAI-State anxiety, *STAI-T*, STAI-Trait anxiety.

range, a relatively high number of patients in the peptic ulcer group showed STAI-T scores in the normal range. Both the correlation coefficient between STAI-T score and severity of the most distressing symptom and the correlation coefficient between STAI-T score and the number of symptoms in the FD group were significantly strong ($P < .05$ and $P < .05$, respectively).

Discussion

Large-scale studies of the general populations of dozens of countries worldwide have found that individuals with upper gastrointestinal symptoms experience a lower QOL [8] and are more greatly affected by health care costs [9] than individuals without upper gastrointestinal symptoms. The cardinal symptoms of FD are upper gastrointestinal symptoms, which are frequently encountered in routine gastroenterology clinical practice. However, FD tends to be neglected because of a lack of associations with any obvious organic abnormality, and a diagnosis based mainly on symptoms. In this study, therefore, to elucidate the clinical features of FD, patients with FD were compared with patients with peptic ulcer, an organic disease that produces similar symptoms of dyspepsia.

In the main study, the FD group included a large number of young women, ranging in age from young to late middle age; few patients displayed predilections to smoking or alcohol consumption, or were obese. Mean age, sex ratio, and smoking and alcohol consumption rates were significantly lower in the FD group than in the peptic ulcer group. The populations were characterized by marked differences in the patient background. Smoking and alcohol consumption tended to be related to age and gender. Next, an investigation that matched the groups for age and gender distribution was conducted in the subanalysis. However, aside from significant differences between the groups in the proportion of

patients who consumed alcohol or experienced nausea, no major changes to these characteristics were noted.

Habitual smoking rates, both with and without age and gender matching, were significantly lower in the FD group than in the peptic ulcer group. Habitual alcohol consumption rate without age and gender matching was significantly lower in the FD group than in the peptic ulcer group; however, age and gender matching did not reveal significant differences.

The proportion of patients with upper abdominal pain, bloating, upper abdominal fullness, nausea, or early satiety in the FD group was equal to or greater than that in the peptic ulcer group, and the proportion of patients with nausea with matching was not significant differences, probably because of the small numbers of patients.

The proportion with upper abdominal fullness or early satiety was markedly higher in the FD group than in the peptic ulcer group, both with and without matching, indicating these symptoms as characteristic of FD. Abdominal fullness in the FD group, both with and without matching, was significantly higher than in the peptic ulcer group ($P < .001$). Early satiety was not seen in any patients in the peptic ulcer group; therefore, no significant difference was identified. Few cases of appetite loss were apparent in either group. The number of symptom that patients have and the symptom severity were significantly greater in the FD group than in the peptic ulcer group. The proportion of patients who had consulted another physician for the gastrointestinal disorder was also significantly greater in the FD group. Moreover, both STAI-S and STAI-T scores tended to be high in the FD group, with the STAI-T score, which indicates personality tendencies, significantly higher. STAI-S score did not show significant differences. STAI were administered during the waiting period prior to upper gastrointestinal endoscopy. Therefore, STAI-S score, which reflects the current state of anxiety during testing, was high in the both FD and peptic ulcer groups. Results of the correlation coefficient and the multiple regressions furthermore suggest that personality tendencies for innate anxiety, which was reflected by STAI-T related to the severity and number of symptom and consultation for another physician, particularly in the FD group.

We suspected that there might be any difference in patient characteristics between the gastric and duodenal ulcer group. However, there was no significant difference present between 2 groups in this study.

These results indicate that, despite the absence of apparent organic abnormalities in the FD group, dyspepsia symptoms were more common and patient distress greater in this group than in the peptic ulcer group. In particular, a pronounced and significant difference was seen between groups in the severity of the most distressing symptom. These results also show that markedly higher proportions of patients in the FD group had consulted another physician for the gastrointesti-

nal disorder and suffered psychosocial distress and distress associated with higher medical costs. In addition, the results suggest that possible background factors in the manifestation of symptoms and the high proportion of patients in this group who had consulted another physician indicate a tendency for these patients to have intrinsically high levels of anxiety and personality tendencies.

Several researchers [10, 11] reported on patients with FD compared with patients with duodenal ulcer. Our results in this study were similar to their results in the point of age, gender, alcohol and smoking consumption, and STAI-T score.

Recently, brain–gut interactions have been considered to play a major role in the mechanisms underlying FGID symptoms [12]. Other factors thought to be involved in this mechanism include stress [13], gastrointestinal dysmotility [14–18], and hypersensitivity [19–24]. In this study, the FD group had characteristic symptoms, such as upper abdominal pain and early satiety. We speculate that these factors are related to the appearance of these symptoms, but the role of these factors has not been adequately elucidated. Dissociation between physiological abnormalities and symptoms has been seen, and the existence of a psychological predisposition to this disorder has therefore been suggested [1, 25, 26].

Evidence also indicates that psychoemotional aspects have a major effect on treatment [27–29]. Based on this background, various psychological interventions, including cognitive therapy [30], psychodynamic–interpersonal psychotherapy [31], hypnotherapy [32], group counseling [33], and combinations of several of these interventions [34], have been tried and efficacies reported.

Because causes of FD are complex and not well understood, treatment poses many problems. The results in this study indicate that FD markedly decreases QOL in a variety of aspects, and improving these aspects should therefore be the ultimate objective of treatment.

Clearly, the absence of organic abnormalities in patients with FD does not mean that the disease can be ignored. On the contrary, the results indicate the importance of taking a thorough history regarding symptoms and course of the disorder, determining levels of distress, and understanding the sources of this distress. Patients who have suffered from symptoms of dyspepsia for long periods despite the absence of obvious organic abnormalities require suitable intervention that takes into account the psychological background of the patient. The gastroenterologist and a psychiatrist or psychologist should cooperate as necessary to restore QOL for the patient.

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