

# Preliminary Psychologic Survey of Orofacial Outpatients. Part 1: Predictors of Anxiety or Depression

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**Aims:** To identify predictors for anxiety and depression in orofacial outpatients and to investigate the patients' compliance rate in taking a series of psychologic tests. **Methods:** Three thousand six hundred sixty-six patients completed a battery of questionnaires. These consisted of items inquiring about sex, age, past history of disease, presence of pain, the Hospital Anxiety and Depression Scale (HADS), the Eysenck Personality Questionnaire Short Form (S-EPQ), a Japanese dental version of the McGill Pain Questionnaire (JDMPQ), a visual analog scale (VAS) of pain, pain duration, and diagnosis. After univariate analyses had determined those variables with significant differences between an over-probable group (OPG, HADS scores  $\geq 8$ ) and an absent group (AG, HADS scores  $< 8$ ), we estimated the odds ratios of these variables for OPG as independent variables, and every variable was adjusted between the independent variables by multiple logistic regression models. **Results:** For anxiety, 3 variables were independently related to the OPG and considered to be meaningful: age 30 or older, neuroticism score on the S-EPQ, and selection of the JDMPQ pain expression term "sickening." For depression, 4 variables were independently related to the OPG and considered to be meaningful: age 30 or older, neuroticism and extroversion scores on the S-EPQ, and selection of the JDMPQ pain expression term "sickening." The compliance rate for the tests was under half of the patients (3,666 of 7,542 patients). **Conclusion:** Although the predictability for anxiety or depression by some baseline parameters is considered to be low, age, personality traits, and choice of certain pain expression terms are useful predictors of anxiety or depression. The improvement of the compliance rate for psychologic screening will be a future challenge for Japanese clinics managing orofacial patients.

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**Key words:** questionnaires, anxiety, depression, predictor, logistic model, regression analysis

Recently, it was reported that the number of patients with psychologic disorders in the general population had increased and would continue to increase.<sup>1,2</sup> Primary care clinics have also reported an increase in mood and anxiety disorders,<sup>3</sup> to the point where it has become necessary to take account of patients' psychologic states to treat their physical illnesses appropriately. However, it has been reported that general practitioners and dentists are not able to evaluate a patient's psychologic condition adequately at the first visit.<sup>3-8</sup> Without considering the patient's psychologic condition, treatments can be ineffective for some patients, who may continue to suffer pain or discomfort. In patients with temporomandibular disorders (TMD), those who

were depressed or had an anxiety disorder were reported to show resistance to conservative treatment.<sup>9-11</sup> Some patients with atypical facial pain were reported to react to physical therapy with acute psychosis.<sup>12</sup> Therefore, an assessment of the patient's overall state, including psychologic condition, is necessary for an appropriate evaluation of disease and effective treatment.

Although some researchers have investigated psychometric evaluation for orofacial diseases, such as TMD<sup>13,14</sup> and burning mouth syndrome,<sup>15,16</sup> no studies have looked for predictors or indicators for anxiety or depression among orofacial patients generally. Since it may be difficult to carry out psychologic testing for all orofacial patients in a dental clinic, a brief screening questionnaire to indicate morbidity of anxiety and/or depression would be very helpful. We thought it possible to use a series of brief questionnaires to select patients who should be managed carefully or be referred to a psychiatrist.

The main objective of this study was to identify the predictive factors of anxiety and/or depression in orofacial patients by multivariate logistic regression analysis. Additionally, this study aimed to investigate the compliance rate among patients for taking psychologic tests, because there were no such baseline data for orofacial patients in Japan.

## Methods

### Subjects and Data Collection

A total of 7,542 consecutive outpatients were recruited between February 1998 and January 1999 from the First Department of Oral and Maxillofacial Surgery, Tokyo Medical and Dental University, and the Department of Dentistry, Jikei University School of Medicine. There were no inclusion criteria because the authors wanted to determine the compliance rate of the total patient group. However, exclusion criteria were as follows: need for emergency treatment, reading problems such as visual impairment or inability to read Japanese, and inability to understand the questions due to young age. After the reasons for the survey were explained to the patients and informed consent was obtained, a battery of self-reporting questionnaires was administered. These consisted of items inquiring about such patient characteristics as sex, age, past history of disease, presence of pain, and pain duration, as well as the Hospital Anxiety and Depression Scale (HADS),<sup>17</sup> the Eysenck Personality Questionnaire Short Form (S-

EPQ),<sup>18</sup> the Japanese dental version of the McGill Pain Questionnaire (JDMPQ),<sup>19</sup> a visual analog scale (VAS) of pain, and diagnosis from the medical record. The disease history questionnaire included questions about cardiopathy, hepatopathy, nephropathy, hypertension, cerebrovascular disease, rheumatoid arthritis, asthma, anemia, tuberculosis, autonomic imbalance, allergies, and other diseases. Patients' diagnoses were classified into 13 categories: dental disease, congenital disease, injury, inflammation, mucous disease, cystic lesion, tumor, TMD, neurologic disease, salivary gland disease, unidentified complaints, miscellaneous disease, or no abnormality.

### Questionnaires

The HADS<sup>17</sup> is divided into 2 subscales: 1 for anxiety and 1 for depression. Each subscale has 7 questions, and the patients' answers are given scores of 0 to 3. On each subscale, a score of 7 or less indicates the absence of anxiety or depression, a score between 8 and 10 suggests the probable presence of the condition, and a score of 11 or more indicates the definite presence of anxiety or depression. This questionnaire is used widely in primary clinics to measure psychologic distress in patients with physical illness because it has no items indicating somatic symptoms influenced by psychological illness and it takes only a short time to complete. All items refer to mood symptoms experienced during the previous week. The validity and usefulness of the HADS have been investigated for many types of diseases,<sup>20-30</sup> including orofacial diseases.<sup>13-16,31,32</sup> The Japanese version of the HADS is also reported to have well accepted reliability and validity in the study of healthy people<sup>33</sup> and for some diseases.<sup>34-36</sup>

The S-EPQ,<sup>18</sup> which can be answered in about 3 minutes, is divided into 2 subscales: 1 for neuroticism and 1 for extroversion. Each subscale has 6 questions, and the patients' answers are given scores of 1 to 4. Therefore, the minimum score is 6 and the maximum is 24. The reliability and the validity of the Japanese version of the S-EPQ have been evaluated, and the test is considered to be effective for detecting neuroticism and extroversion.<sup>37</sup>

The original MPQ is a multidimensional method of evaluating pain that uses 78 terms that are classified into 4 categories: sensory, affective, evaluative, and miscellaneous.<sup>38</sup> The questionnaire has been translated into Japanese and is considered to have high reliability.<sup>39</sup> In this study, the JDMPQ was used.<sup>19</sup> The JDMPQ has 24 terms associated

with orofacial pain that were extracted from the original 4 categories: 16 sensory, 3 affective, 2 evaluative, and 3 miscellaneous. The patients were asked to choose 1 or more terms to describe their pain.

### Dependent Variables

The total anxiety score and the depression score of the HADS subscales were divided into 2 groups, respectively. In each subscale, 2 groups were defined as dependent variables: the absent group (AG), with scores of less than 8, and the overprobable group (OPG), with scores greater than or equal to 8.

### Independent Variables

Independent variables included sex, age, number of past diseases, neuroticism and extroversion scores from the S-EPQ, presence of pain, measured value (mm) of VAS of pain, pain duration, choice of terms in the JDMPQ, and diagnosis.

### Statistical Analyses

No variables had a normal distribution; therefore, a measure of central tendency was shown as the median and 25th and 75th percentiles. Continuous variables with a nonlinear relationship to the logarithm of the odds of the dependent variables, such as age and number of past diseases, were separated into 2 categories through the use of appropriate cutoff values that were determined by plotting the log-odds against values of the independent variable. Differences between patients in the AGs and OPGs were compared by the Mann-Whitney *U* test and the chi-square test in univariate analyses. If a variable showed a significant difference between the AGs and OPGs in the univariate analysis, estimated odds ratios for the OPGs were then calculated and the variable was adjusted between independent variables by multiple logistic regression models. All variables with a *P* value < .01 (2-tailed) in univariate analysis were tested. The covariates were entered into the logistic regression by a stepwise forward technique. Diagnostic data were also entered into the model as categorical variables. A *P* value < .01 was regarded as statistically significant. As a predictor, an odds ratio was considered to be meaningful for clinical use when the value was greater than or equal to 2 or when it was less than or equal to 0.5. The data were analyzed by SPSS Software for Windows, Version 9.0.

**Table 1** Patient Characteristics

Characteristics	n
No. of patients	3,666
Sex (% male)	43.3
Age in years (median, 25%, 75%)	31 (24,48)
No. of past diseases (median, 25%, 75%)	1 (0, 2)
S-EPQN score (median, 25%, 75%)	14 (11, 16)
S-EPQE score (median, 25%, 75%)	17 (15, 19)
Patients having pain (%)	58.6
Duration of pain in days (median, 25%, 75%)	30 (8, 300)
VAS of pain in mm (median, 25%, 75%)	27 (4, 56)

S-EPQN = neuroticism score from S-EPQ; S-EPQE = extroversion score from S-EPQ.

## Results

### Subject Characteristics

During the survey period, all 7,542 outpatients who visited the 2 clinics were asked to participate in the survey. Of these, 1,975 patients (26.2%) were unwilling or unable to participate because of poor general health, reading problems, or youth. Of the 5,567 sets of questionnaires collected, 1,901 were not complete. The numbers of questionnaires with incomplete subscales were 1,674 (30.1%) for anxiety, 1,693 (30.4%) for depression of the HADS, and 1,540 (27.7%) for neuroticism and 1,617 (29.0%) for extroversion on the S-EPQ; these patients were excluded from the analysis. Consequently, 3,666 (48.6% of the original 7,542 outpatients) cases were eligible for the analysis.

The characteristics of the enrolled patients are shown in Table 1. More women than men participated in the study. The median personality score measured with the S-EPQ was 14 points for neuroticism and 17 points for extroversion. Of all responders, 58.6% had pain at the time of their visit. The median duration of pain was 30 days and the median VAS score for pain was 27 mm.

When the responders were divided into absent, probable, and definite categories for anxiety or depression, 2,662 patients (72.6%) were categorized as absent for both anxiety and depression; 582 (15.9%) and 369 (10.1%) patients were probable and definite for anxiety, respectively; and 207 (5.6%) and 82 (2.2%) patients were probable and definite for depression, respectively (Table 2).

With a cutoff value of 8, 951 (26.0%) patients and 289 (7.8%) patients would have been included in the OPGs for anxiety and depression, respectively. In the univariate analysis, there was no significant difference in sex distribution in the OPGs for depression or for anxiety. Significant

**Table 2** Distribution of Anxiety and Depression Patients According to HADS

Depression subscale scores	Anxiety subscale score (n and %)			Total
	Absent (0-7)	Probable (8-10)	Definite (11-21)	
Absent (0-7)	2,662 (72.6)	495 (13.5)	220 (6.0)	3,377 (92.1)
Probable (8-10)	46 (1.3)	72 (2.0)	87 (2.4)	207 (5.6)
Definite (11-21)	7 (0.2)	13 (0.4)	62 (1.7)	82 (2.2)
Total	2,715 (74.1)	582 (15.9)	369 (10.1)	3,666 (100.0)

**Table 3** Univariate Analysis

Patient characteristics	Anxiety			Depression		
	Absent	Over-probable	<i>P</i> value	Absent	Over-probable	<i>P</i> value
No. of patients	2,715	951		3,377	289	
Sex (% male)	44.3	40.2	.027	43.3	42.6	.853
Age over 30 years (%)	51.3	61.8	.000	52.5	71.3	.000
Past diseases $\geq 2$ (%)	22.0	33.7	.000	23.6	40.9	.000
S-EPQN score (median, 25%, 75%)	13 (11, 15)	16 (14, 18)	.000	14 (11, 16)	16 (14, 19)	.000
S-EPQE score (median, 25%, 75%)	17 (15, 19)	16 (14, 19)	.000	17 (15, 19)	16 (13, 18)	.000
Patients having pain (%)	56.1	65.9	.000	57.4	73.4	.000
Duration of pain in days (median, 25%, 75%)	30 (7, 180)	60 (10, 365)	.000	30 (8, 270)	60 (10, 545)	.014
VAS of pain in mm (median, 25%, 75%)	25 (3, 54)	33 (10, 62)	.000	25 (4, 55)	43 (15, 70)	.000

S-EPQN = neuroticism score from S-EPQ; S-EPQE = extroversion score from S-EPQ.

differences were found between the AGs and OPGs for both anxiety and depression with respect to the following variables: age 30 or older, 2 or more past diseases, positive scores for neuroticism and extroversion, presence of pain, and pain intensity (VAS). Duration of pain was significant in the OPG for anxiety, but not in the OPG for depression (Table 3).

Inclusion in the OPG for anxiety was most frequent among those patients with unidentified complaints (40.7%) and the least frequent among those with cystic lesions (19.9%). Presence in the OPG for depression was most frequent among those patients with neurologic disease (17.9%) and least frequent among those with congenital disease (1.9%) (Table 4).

Compared with the patients in the AG for anxiety, those in the OPG for anxiety selected more terms in the JDMPQ (15 terms), as did those in the OPG for depression (15 terms). However, the percentage of those in both OPGs who chose the 7 terms "pulsing," "shooting," "pricking," "tingling," "itchy," "stinging," and "spreading" was not significantly different from those in the AGs for either anxiety or depression. The terms "throbbing" and "tugging" were chosen by significantly more patients in the OPG for anxiety than by

those in the AG for anxiety; however, there was no difference between these in the OPG and AG for depression. Similarly, the terms "quivering" and "piercing" were chosen significantly more often by the patients in the OPG for depression, but not by those in the OPG for anxiety (Table 5).

#### Predictors of Anxiety and Depression

Multiple logistic regression analyses were carried out on the variables listed previously that had revealed significant statistical differences ( $P < .01$ ) between the AGs and OPGs in univariate analyses. In the analysis for anxiety, 4 variables were independently related to OPG ( $P < .01$ ): age 30 or older, neuroticism score on the S-EPQ, extroversion score on the S-EPQ, and choice of the JDMPQ term "sickening." Of these 4 variables, the 3 variables of age 30 or older, neuroticism score on the S-EPQ, and choice of the term "sickening" were considered to be meaningful predictors (odds ratio  $\geq 2.0$ ). In the analysis for depression, 7 variables were found to be independently related to OPG ( $P < .01$ ): age 30 or older, 2 or more past diseases, neuroticism score on the S-EPQ, extroversion score on the S-EPQ, and choice of the JDMPQ terms "heavy," "tender," and "sickening." Of these 7

**Table 4** Distribution of Diagnostic Groups (n and %)

Diagnostic group	n	Over-probable for anxiety (%)	Over-probable for depression (%)
Dental disease	1,821	436 (23.9)	127 (7.0)
Congenital disease	105	21 (20.0)	2 (1.9)
Injury	83	20 (24.1)	9 (10.8)
Inflammation	167	53 (31.7)	24 (14.4)
Mucous disease	209	74 (35.4)	21 (10.0)
Cystic lesion	166	33 (19.9)	9 (5.4)
Tumor	122	30 (24.6)	5 (4.1)
Temporomandibular disorder	811	227 (28.0)	73 (9.0)
Neurologic disease	39	15 (38.5)	7 (17.9)
Salivary gland disease	40	12 (30.0)	4 (10.0)
Unidentified complaints	27	11 (40.7)	2 (7.4)
Miscellaneous diseases	62	16 (25.8)	4 (6.5)
No abnormality	14	3 (21.4)	2 (14.3)
Total	3,666	951 (25.9)	289 (7.9)

**Table 5** Selection Rate of JDMPQ Pain Expression Terms in Absent and Over-probable Patients

JDMPQ term	Anxiety			Depression		
	Absent (%)	Over-probable (%)	<i>P</i> value	Absent (%)	Over-probable (%)	<i>P</i> value
Quivering	2.6	3.9	.045	2.7	6.0	.001
Pulsing	1.3	2.2	.059	1.4	2.8	.057
Throbbing	9.8	13.1	.004	10.4	13.2	.152
Beating	8.0	11.2	.003	8.4	13.2	.007
Flashing	6.5	9.6	.002	6.9	11.7	.003
Shooting	6.2	6.7	.604	6.3	7.1	.594
Pricking	1.3	2.1	.115	1.5	2.1	.379
Tugging	2.4	5.1	.000	2.9	5.3	.023
Tingling	2.1	3.1	.078	2.3	3.6	.180
Itchy	2.9	3.8	.165	3.0	4.6	.129
Stinging	5.6	6.6	.239	5.6	8.5	.044
Dull	9.0	14.1	.000	9.9	14.9	.008
Sore	11.0	16.7	.000	11.9	18.9	.001
Aching	8.2	11.9	.001	8.5	17.1	.000
Heavy	7.3	14.8	.000	8.2	21.0	.000
Tender	8.0	10.9	.007	8.3	13.2	.006
Tiring	3.8	8.7	.000	4.6	11.0	.000
Sickening	1.7	7.8	.000	2.3	15.3	.000
Wretched	4.8	12.4	.000	5.8	18.1	.000
Troublesome	8.6	14.7	.000	9.4	18.9	.000
Unbearable	3.4	6.8	.000	3.5	12.8	.000
Spreading	4.5	5.8	.128	4.6	7.5	.031
Piercing	1.1	2.2	.016	1.2	3.2	.006
Numb	2.5	5.6	.000	2.8	8.9	.000

**Table 6** Multivariate Logistic Regression Analysis for OPG of Anxiety

Factors	Odds ratio	95% confidence interval	P value
Age < 30 years	1	—	—
Age ≥ 30 years*	2.00	1.51–2.65	.000
No. of past diseases < 2	1	—	—
No. of past diseases ≥ 2	1.41	1.05–1.90	.025
S-EPQN score*	3.58 <sup>†</sup>	2.37–5.40	.000
S-EPQE score	0.69 <sup>†</sup>	0.70–0.72	.000
Selection of JDMPQ terms			
Did not select "heavy"	1	—	—
Selected "heavy"	1.58	1.11–2.24	.011
Did not select "sickening"	1	—	—
Selected "sickening"*	2.67	1.53–4.64	.001
Did not select "wretched"	1	—	—
Selected "wretched"	1.58	1.06–2.34	.023

\*Meaningful predictor ( $P < .01$ , odds ratio  $\geq 2.0$  or  $\leq 0.5$ ).

<sup>†</sup>Corresponds to 5-point increments, since 1-point increments did not produce meaningful odds ratios (see Discussion).

**Table 7** Multivariate Logistic Regression Analysis for OPG of Depression

Factors	Odds ratio	95% confidence interval	P value
Age < 30 years	1	—	—
Age ≥ 30 years*	3.65	2.38–5.60	.000
No. of past diseases < 2	1	—	—
No. of past diseases ≥ 2	1.97	1.33–2.89	.001
S-EPQN score*	3.05 <sup>†</sup>	2.89–3.22	.000
S-EPQE score*	0.48 <sup>†</sup>	0.46–0.51	.000
Selection of JDMPQ terms			
Did not select "heavy"	1	—	—
Selected "heavy"	1.99	1.26–3.15	.003
Did not select "tender"	1	—	—
Selected "tender"	1.93	1.20–3.09	.007
Did not select "sickening"	1	—	—
Selected "sickening"*	5.57	3.20–9.71	.000
Did not select "piercing"	1	—	—
Selected "piercing"	3.03	1.26–7.29	.013

\*Meaningful predictor ( $P < .01$ , odds ratio  $\geq 2.0$  or  $\leq 0.5$ ).

<sup>†</sup>Corresponds to 5-point increments, since 1-point increments did not produce meaningful odds ratios (see Discussion).

variables, the 4 variables of age 30 or older, neuroticism and extroversion score on the S-EPQ, and choice of the term "sickening" were considered to be meaningful predictors (odds ratio  $\geq 2.0$  or  $\leq 0.5$ ). No other variable, such as diagnosis, presence of pain, duration of pain, VAS of pain, or choice of other pain terms, was selected. All selected variables, except for extroversion score, became positive predictors in both analyses. Only the extroversion score on the S-EPQ was selected as a negative predictor (Tables 6 and 7).

## Discussion

### Compliance Rate

Rugh and coworkers have stated that patient compliance was likely to be much better when shorter instruments are used.<sup>40</sup> However, as expected, many patients refused to participate in this study, and a considerable number of patients who consented to participate were unwilling to answer several questions on the HADS. This may have been because the patients felt that they had come to a

dental clinic and not to a psychiatric clinic. In Japan, many people still refuse to recognize the relationship between physical condition and psychologic state. It is also possible that, although the individual questionnaires had few items, the total battery contained too many questionnaires.

In this study, we did not use strict inclusion criteria and continued the survey for 1 year because we wanted to know the compliance rate for orofacial patient participation in psychologic tests. Less than half of the total number of outpatients responded, and this compliance rate should be taken into account in the design of future research. Because the analyzed cases represented only 48.6% of the total outpatients, it is difficult to consider these cases to be representative or to discuss the prevalence of orofacial patients with either anxiety or depression.

### Predictors

We analyzed data from over 3,000 patients and tested 45 variables in this study. In such extensive statistical analyses involving a large sample and the testing of many variables, the probability of type II error increases according to the size of the sample, and some differences in variables may achieve significance by chance. Therefore, we adopted a significance level of .01 ( $\alpha = .01$ ) for both the univariate analysis and the multivariate significant test to minimize the likelihood of type II error.

In the logistic regression analyses, except for the extroversion score on the S-EPQ, the same variables (age 30 or older, neuroticism scores, and choice of the term "sickening") were selected as significant independent variables and as meaningful predictors in both models; however, sex, number of past diseases, presence of pain, duration of pain, VAS of pain, and diagnosis were not selected. This was thought to be a result of the strong correlation between the HADS scores for anxiety and depression (Spearman's rank correlation coefficient 0.547,  $P = .000$  [2-tailed]).<sup>21</sup> This suggests that the baseline data would have less ability to discriminate between anxiety and depression as evaluated by the HADS.

Advancing age was thought to be a risk indicator for depression.<sup>41</sup> However, younger patients with rheumatoid arthritis have been reported to be more depressed than older patients.<sup>24,42</sup> On the other hand, no age differences were reported in cancer patients with regard to depression.<sup>27,29</sup> In a validation study of the HADS for 6 different groups of Dutch subjects, Spinhoven and coworkers

found no evidence for a clinically relevant linear relationship between age and HADS total or subscale scores.<sup>21</sup> These reports suggested that the relationship between age and HADS score was not so clear. In this study, age 30 or older was selected as a predictor for both anxiety and depression. During the data analysis, log-odds ratios of the probability of presence in the OPGs for both anxiety and depression increased rapidly at age 30 or older. Therefore, we should consider the possibility that the presence of anxiety and depression begins to increase at age 30. In particular, since the odds ratio was 3.65 for the OPG of depression, patients age 30 or older should be managed very carefully.

Becker and coworkers<sup>43</sup> reported that 50% of chronic pain patients had HADS scores over 8, indicating anxiety, and 40% of the patients had scores over 8, indicating depression. They suggested that this was related to a higher rate of both anxiety and depression among those referred patients who had long-standing pain and visited their clinic.<sup>43</sup> In the present study, although there were more patients with pain in the OPGs than in the AGs for anxiety and depression (Table 3) among the total responders, among those with persistent chronic pain for longer than 6 months, 200 patients (34.4%) had HADS scores over 8 for anxiety and 66 patients (11.4%) had HADS scores over 8 for depression (data not presented in Table 3). Both scores among the chronic pain patients were lower than those in the report by Becker et al,<sup>43</sup> probably because there were not so many chronic pain patients in this study.

With regard to the presence of pain, Von Korff and coworkers, in a survey comparing chronic pain complaints of patients with back pain, headache, abdominal pain, chest pain, and facial pain, presented odds ratios associating the likelihood of these pains with anxiety and depression. Their Symptom Check List anxiety/depression scale did not show a significant independent association with facial pain, although they did not discuss this result.<sup>44</sup> Their result is consistent with our finding of less association between the presence of pain and anxiety or depression; however, the choice of pain-associated term might be affected by anxiety or depression. The selection of the term "sickening" from the JDMPQ as a predictor may be a descriptor reflecting the psychologic state of patients in pain, rather than the intensity of the pain itself, because it does not appear to be a direct expression of pain intensity. The odds ratios for "sickening" were 2.67 for the anxiety OPG patients and 5.57 for depression OPG

patients. We therefore considered this affective descriptor as a powerful indicator for morbidity of anxiety and depression. These findings agree with the results of Benjamin and coworkers<sup>45</sup> that the MPQ was unlikely to be helpful in differentiating the organic status of pain clinic patients but was more likely to provide some indication of patients' mental state.<sup>45</sup>

Other investigators also suggested the relevance of affective descriptors in depressed patients.<sup>46-50</sup> Sist et al stated that depressed patients chose more MPQ affective descriptors than non-depressed patients.<sup>50</sup> Since the MPQ is much better accepted by pain patients than other psychological questionnaires, it is useful for screening possible morbidity of anxiety or depression in pain patients in primary care clinics. Since pain intensity showed a strong relevance to scores of quality of life but not to psychological state, Becker and coworkers suggested that pain might first disrupt a patient's daily life, and then the disability or physical function would increase the patient's anxiety and depression.<sup>43</sup> Although both the OPGs of anxiety and depression had significantly more patients in pain with longer pain duration and higher VAS scores than the AGs in the univariate analysis, none of these variables were selected as significant independent variables in the logistic regression analysis. These results, adjusted by multivariate logistic regression models, suggest that pain intensity itself might not be associated with anxiety or depression in orofacial patients. Future research is necessary to investigate the relationship between pain, functional disability, and psychological morbidity through the use of a set of questionnaires containing functional disability scores, as indicated by the findings of Becker et al.<sup>43</sup>

Personality traits were reported to be correlated with anxiety or depression. In the logistic regression analyses of the present study, an increase in the neuroticism score of the S-EPQ increased the odds ratio of the probabilities for diagnoses of anxiety and depression, whereas an increase in the extroversion score decreased the odds ratio, especially for depression. As presented in Table 6, a patient whose neuroticism subscore was 5 points higher than any other patient indicated 3.58 times greater morbidity of anxiety. On the other hand, a patient whose extroversion subscore was 5 points higher showed a smaller decrease (odds ratio = 0.69) in the morbidity for anxiety. As for depression, a patient whose neuroticism or extroversion subscore was 5 points higher than any other patient indicated a 3.05 times increase or a 0.48 times decrease of odds for depression, respectively

(see Table 7). In Tables 6 and 7, the odds ratios for neuroticism and extroversion scores are presented as corresponding to 5-point increments for both subscales. Although a 1-point increment also significantly increased or decreased the odds ratio, a meaningful odds ratio ( $\geq 2.0$  or  $\leq 0.5$ ) was not obtained. With a 5-point increment, meaningful odds ratios were obtained. These results agree with previous reports.<sup>51-53</sup> Therefore, the neuroticism score was considered to be a positive predictor, while the extroversion score was considered to be a negative predictor.

In this study, no particular disease became a predictor, although patients with unidentified complaints had high scores for anxiety and those with neurologic disease had high scores for depression. In a study of cancer patients, the prevalence of anxiety and depression did not vary significantly between various groups of cancer patients (ie, patients with different types of cancer).<sup>27,29</sup> In the logistic regression analysis, the disease-related parameters also did not remain independent parameters predictive for depression or anxiety.<sup>29</sup> In a study of Hodgkin's disease survivors, none of the stage-of-disease variables examined were predictive of depression.<sup>30</sup> In a study of rheumatoid arthritis, Chandarana et al mentioned that illness in itself was not the most relevant consideration but that the rheumatoid patient's ability to perform normal daily activities was important to his or her emotional health.<sup>24</sup> In the present study, all subjects were first-visit patients who did not recognize their diagnoses, and there were few patients with severe, malignant, or lethal conditions. Therefore, we feel our results are reasonable for orofacial patients, most of whom have less continuous disability.

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