Journal of Oral Science, Vol. 54, No. 4, 321-327, 2012

Original

Pain intensity and psychosocial characteristics of patients with burning mouth syndrome and trigeminal neuralgia

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(Received 26 July and accepted 27 October 2012)

Abstract: This study compared pain intensity and psychosocial characteristics between patients with burning mouth syndrome (BMS) and those with trigeminal neuralgia (TN). Data from 282 patients with BMS and 83 patients with TN were analyzed. Patients reported duration of illness: duration ≤ 6 months was defined as acute illness and > 6 months as chronic illness. Present pain intensity and worst pain intensity during the past 6 months were reported using a 0-10 numeric rating scale (NRS). In addition, depression and somatization scores were evaluated on questionnaires. Patients with chronic BMS reported significantly higher pain intensity and had worse psychosocial characteristics than did those with acute BMS. Pain intensity was higher in TN patients than in BMS patients, although neither pain intensity nor psychosocial characteristics significantly differed between patients with acute and chronic illness. Logistic regression analysis of BMS and TN patients revealed that the odds ratio for worst pain was significantly lower for BMS patients than for TN patients and that the odds ratio for somatization score was 3.8 times higher in BMS patients. These findings suggest that BMS patients may require pain control targeting the central nervous system or psychosocial characteristics. (J Oral Sci 54, 321-327, 2012)

Keywords: orofacial pain; trigeminal neuralgia; burning mouth syndrome; depression; somatization.

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Introduction

Burning mouth syndrome (BMS) is a chronic, intractable pain condition characterized by a burning sensation or other dysesthesias of the oral mucosa, without abnormal clinical or laboratory findings (1). The International Association for the Study of Pain has identified BMS as a "distinctive nosological entity" characterized by "unremitting oral burning or similar pain in the absence of detectable oral mucosa changes" (2). The tongue is the primary location of the burning complaint in most cases, and this pathology has also been called glossodynia (3).

Table 1 Inclusion and exclusion criteria for the present study

Burning mouth syndrome (BMS)	Trigeminal neuralgia (TN)
Inclusion criteria	
1) Presence of an isolated complaint of pain in the tongue or oral mucosa with a normal clinical examination. 2) Nonparoxysmal pain throughout all or part of the day that does not follow a nerve trajectory. 3)Absence of an organic condition that could be considered a causative factor, such as diabetes, anemia, or *Candida* infection. 4) No psychiatric treatment, as indicated in the International Association for the Study of Pain (IASP) criteria for BMS	The International Classification of Headache Disorders (Second Edition) criteria for classic primary TN, as follows: 1) Paroxysmal attacks of pain lasting from a fraction of a second to 2 minutes, affecting 1 or more divisions of the trigeminal nerve and fulfilling criteria 2) and 3). 2) Pain that has at least 1 of the following characteristics: intense, sharp, superficial or stabbingprecipitated from trigger areas or by trigger factors 3) Attacks are stereotyped in the individual patient 4) No clinically evident neurologic deficit 5) Not attributable to another disorder
Exclusion criteria	
Temporomandibular disorders, herpes zoster, maxillary sinusitis, cluster headaches, and paroxysmal hemicranias and other headaches, and psychiatric disorder	

Despite many clinical and epidemiologic studies, the pathogenesis and etiology of BMS are unclear. Systemic factors such as diabetes, nutritional deficiencies, hormonal changes, and psychological disorders, as well as local causes such as oral infections, allergies, galvanism, salivary grand function, changes in salivary components, and dental treatment have been considered as potential causative mechanisms (4). However, BMS is idiopathic in most patients. Some researchers have suggested that trigeminal small-fiber neuropathy causes BMS (5,6).

Trigeminal neuralgia (TN) is defined as sudden (usually unilateral) severe, brief, stabbing episodes of recurrent pain within the distribution of one or more branches of the trigeminal nerve. This neuropathic disorder can be profoundly distressing and may negatively affect well-being (7). Compression of the trigeminal nerve root by an artery, or more rarely a vein, is demonstrable in 90-95% of patients, according to findings from a series of patients who underwent microvascular decompression for TN (8). TN often causes depression and has even resulted in suicide in some individuals. Carbamazepine is the drug of choice, and treatment is usually initially effective (9). Unfortunately, more than 75% of patients need neurosurgery to control pain during the first 5 years (10). The long history of pain and return of crises are important factors that underscore the need for support of these patients (11).

Different types of orofacial pain may have varying pain intensities and psychosocial characteristics. The aim of this study was thus to explore the relationship between pain intensity and psychosocial characteristics in patients with BMS and TN.

Methods

Subjects

The subjects were recruited from among patients in our clinic who sought treatment for orofacial pain during 2007-2010 (total, 3,645 patients) and were selected according to the criteria below (Table 1).

The inclusion criteria for BMS patients were the presence of an isolated complaint of pain in the tongue or oral mucosa and a normal clinical examination. Pain had to be present during all or part of the day, with no paroxysms, and was not found to follow a nerve trajectory. Patients presenting with an organic condition that could be considered a causative factor, such as diabetes or anemia, were excluded, as were patients who had received treatment by a psychiatrist, as indicated in the BMS criteria of the International Association for the Study of Pain (IASP) (2). Local or systemic conditions were evaluated using laboratory examination in all subjects (eg, blood cell count, serum iron folate level, detection of *Candida*, etc.). Ultimately, data from 282 patients with BMS were analyzed. In all subjects, symptoms were limited to the tongue.

The inclusion criteria for TN patients adhered to the International Classification of Headache Disorders (Second Edition) criteria for classic primary TN (12). Data from 83 patients with TN in branches 2 and 3 were analyzed.

Exclusion criteria for both groups were temporomandibular disorders, herpes zoster, maxillary sinusitis, cluster headache, and paroxysmal hemicranias and other headaches.

All subjects were informed about the study in a standardized manner. The institutional ethics committee approved the study (EC07-003), which also followed the

Table 2 Demographic and psychosocial characteristics and reported pain intensity among subjects

Disease		Burning mouth syndrome		Trigeminal neuralgia	
Duration of illness		Acute (≤ 6 months)	Chronic (> 6 months)	Acute (≤ 6 months)	Chronic (> 6 months)
Number of subjects		169	113	43	40
Sex	women : men (% women)	133:36 (78.7%)	100:13 (88.5%)	33:10 (76.7%)	26:14 (65.0%)
Age	mean ± SD	59.2 ± 14.1	62.7 ± 10.9	63.7 ± 14.9	57.5 ± 16.8
Present pain	mean (95% CI)	3.2 (2.9-3.5)	4.0 (3.6-4.4)	5.1 (4.3-5.8)	5.6 (4.8-6.4)
Worst pain		4.7 (4.4-5.0)	5.6 (5.1-6.0)	7.6 (6.8-8.4)	8.4 (7.9-9.0)
Depression		0.394 (0.308-0.481)	0.544 (0.435-0.653)	0.224 (0.109-0.340)	0.410 (0.232-0.588)
Somatization		0.380 (0.310-0.450)	0.499 (0.393-0.604)	0.240 (0.128-0.352)	0.321 (0.198-0.443)

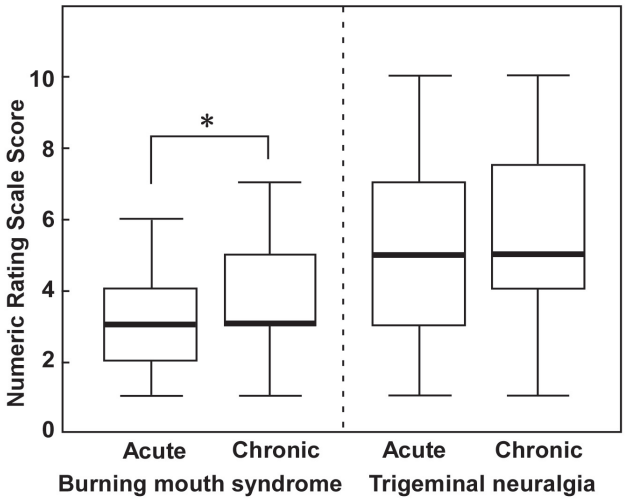

Fig. 1 Box-and-whisker plot for present pain intensity. The ranges represented by boxes are from lower quartile to upper quartile, and whisker showed the smallest observation and largest observation. Bold line in the box showed median value. (*$P < 0.05$ Wilcoxon rank-sum test)

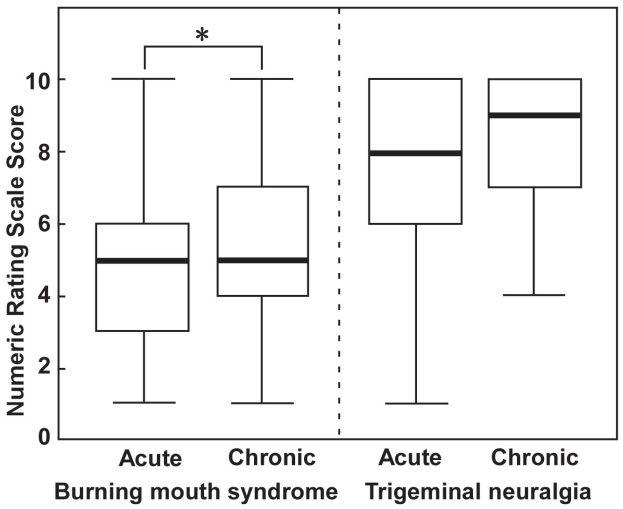

Fig. 2 Box-and-whisker plot for worst pain intensity during the past 6 months. The ranges represented by boxes are from lower quartile to upper quartile, and whisker showed the smallest observation and largest observation. Bold line in the box showed median value. (*$P < 0.05$ Wilcoxon rank-sum test)

guidelines set out by the Helsinki Declaration.

Self-reported measures

The age and sex of participants were noted. Patients reported duration of illness: duration ≤ 6 months was defined as acute illness and > 6 months as chronic illness. Present pain intensity and worst pain intensity during the past 6 months were also reported using a 0-10 numeric rating scale (NRS) (13). In addition, with regard to psychosocial characteristics, depression and somatization scores were evaluated with the Research Diagnostic Criteria for Temporomandibular Disorders (RDC-TMD) Axis II questionnaire (14).

Statistical analysis

Descriptive statistics were used to summarize the basic characteristics of subjects and all measurements. The χ^2 test was used to evaluate the female/male ratio of subjects. Mean differences between disease type (BMS vs TN) and duration of illness (acute vs chronic) were analyzed by analysis of variance. Effects of duration of illness were analyzed using the Wilcoxon rank-sum test for each disease and variable (present pain, worst pain, depression score, and somatization score).

Multiple logistic regression analysis was used to evaluate factors of disease associated with sex, age, illness duration, present pain, worst pain, depression, and somatization.

Statistical significance was defined as $P < 0.05$. All

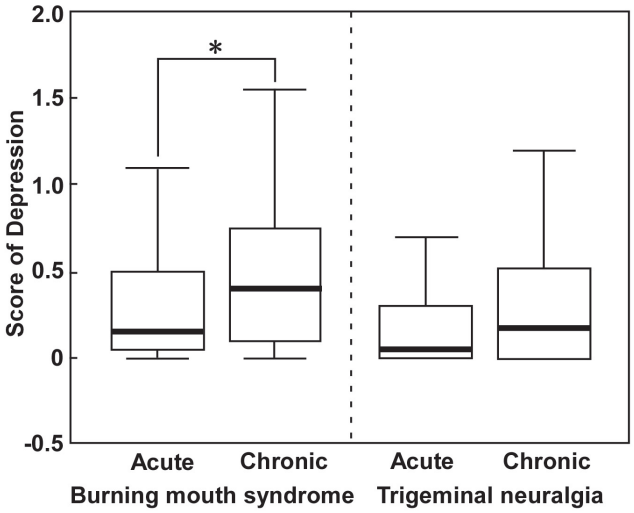

Fig. 3 Box-and-whisker plot for depression score. The ranges represented by boxes are from lower quartile to upper quartile, and whisker showed the smallest observation and largest observation. Bold line in the box showed median value. (*$P < 0.05$ Wilcoxon rank-sum test)

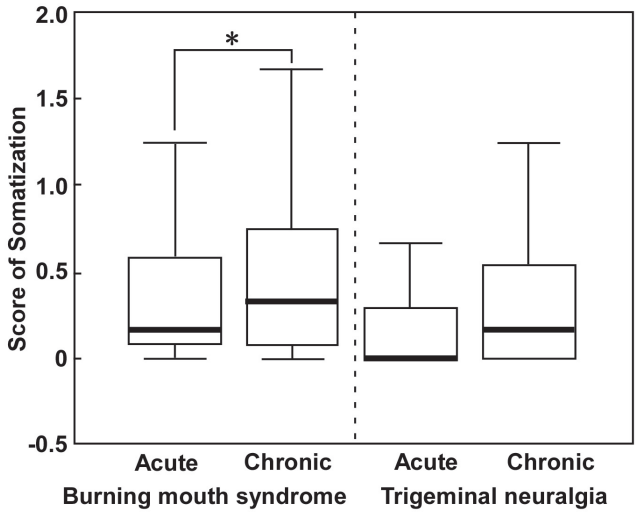

Fig. 4 Box-and-whisker plot for somatization score. The ranges represented by boxes are from lower quartile to upper quartile, and whisker showed the smallest observation and largest observation. Bold line in the box showed median value. (*$P < 0.05$ Wilcoxon rank-sum test)

Table 3 Results of multiple logistic regression analysis with disease as explanatory variable

Variables	Odds ratio	95% CI	*P*
Age	1.004	0.984-1.025	0.674
Sex (women : men)	2.703	1.303-5.611	**0.008**
Duration of illness	1.106	0.783-1.564	0.567
Present pain intensity	0.943	0.788-1.129	0.525
Worst pain intensity	0.551	0.460-0.659	**0.000**
Depression score	1.327	0.598-2.946	0.486
Somatization score	3.835	1.324-11.102	**0.013**

Significant values are shown in bold type.
Odds ratios represent change in odds per 1-unit change in each BMS variable.

analyses were conducted using SPSS for Windows version 12.0 (SPSS, Chicago, IL, USA).

Results

Descriptive data for each disease are shown in Table 2. No significant difference in mean age was seen with respect to disease type (BMS and TN; $P = 0.438$) or duration of illness (acute and chronic; $P = 0.334$). The female/male ratio was significantly higher in the BMS group than in the TN group ($P = 0.018$). However, no significant difference in sex distribution was seen between patients with acute and chronic illness ($P = 0.206$)

Pain intensity and psychosocial variables in relation to illness duration in BMS and TN patients

Among BMS patients, present pain intensity and worst pain intensity were significantly higher among patients with chronic as compared with acute disease ($P = 0.001$). However, no such difference in pain intensity was seen in TN patients ($P = 0.324$ and $P = 0.181$ for present and worst pain intensity, respectively; Fig. 1)

Among BMS patients, depression scores were significantly higher among those with chronic as compared with acute disease ($P = 0.001$). However, no such difference in depression scores was seen in TN patients ($P = 0.150$; Fig. 2).

Patients with chronic BMS had a significantly higher somatization score than did those with acute BMS ($P = 0.027$). However, no such difference in somatization score was seen in TN patients ($P = 0.152$; Fig. 3).

Logistic regression analysis of differences between BMS and TN patients

The results of logistic regression analysis of differences between BMS and TN patients are shown in Table 3. Logistic regression analysis identified significant associations with sex (odds ratio [OR] = 2.703, 95% CI = 1.303-5.611, $P = 0.008$), worst pain intensity (OR = 0.551, 95% CI = 0.460-0.659, $P < 0.001$), and somatization score (OR = 3.835, 95% CI = 1.324-11.102, $P = 0.013$).

Discussion

Patients with chronic (ie, duration > 6 months) BMS had significantly higher present and worst pain intensity and less favorable psychosocial characteristics as compared with those with acute disease. However, even though pain intensity was higher in TN patients than in BMS patients, no significant differences in pain intensity or psychosocial characteristics were apparent among patients with chronic conditions. Furthermore, logistic regression analysis of BMS and TN patients showed that the OR for worst pain intensity in BMS patients was half that in TN patients and that the OR for somatization score was 3.8 times higher in BMS patients. These findings indicate that, although pain intensity was more severe in TN patients than in BMS patients, somatization score was higher in BMS patients.

In this study, the mean ages of BMS and TN patients were almost identical, but there was a greater proportion of females in the BMS group. Logistic regression analysis showed that the female/male ratio of BMS patients was 2.7 times that of TN patients. BMS is a disorder typically observed in middle-aged and elderly adults (15-17), and the female/male ratio is about 7:1 (15,17-19). The National Health Interview Survey indicated that the prevalence of burning mouth in the US general population aged 18 years or older was 0.7% (0.8% of women and 0.6% of men). The overall crude incidence rate of TN per 100,000 population in Rochester, Minnesota during 1945-1984 was 4.3 for men and women combined. The age-adjusted (to the total US population in 1980) rate for women (5.9%) was significantly higher than that for men (3.4%). A UK survey also found a higher incidence of TN in females in all age groups (20). Our present results support these earlier findings. Women may be more sensitive than men to pain, and a variety of factors may contribute, including hormonal alterations—women showed less ischemic pain sensitivity during the midfollicular vs the ovulatory and mid-to-late luteal phases during their menstrual cycle (21) and significantly shorter pain tolerance times and marginally shorter pain threshold times in the luteal vs. follicular phase (22)—and blood pressure (systolic, diastolic, and mean arterial pressures were significantly correlated with thermal and ischemic pain responses, and higher blood pressure was associated with lower pain sensitivity) (23). In addition, other investigators have reported that expectations of sex roles may moderate differences between sexes. There was a significant correlation between masculinity-femininity and pain: higher masculinity was associated with higher pain thresholds (24). Anxiety may also moderate differences between sexes: females reported a larger number of pain sites and greater health care utilization, and also had greater sensitivity to thermal stimuli, after correcting for psychological variables, including hypervigilance and sex role expectations (25).

We found that pain intensity and psychosocial scores increased in BMS patients but not TN patients when illness duration was prolonged. Generally, pain intensity in orofacial pain syndromes (such as temporomandibular disorders) will increase with duration of illness, as will depressive tendencies (10,12). This tendency was observed among BMS patients but not TN patients in the present study. Although TN is a chronic pain disorder, its psychosocial impact may be limited because the cause is clear, pain is paroxysmal (not continuous), and pain control treatments are effective (26). In contrast, the causes of BMS are unclear (4). Therefore, anxiety regarding worsening symptoms and prolonged illness may contribute to increased pain intensity and adverse psychosocial effects. Consequently, there is an urgent need to identify the causes of BMS and develop effective treatment methods.

Previous studies reported that mean pain severity in BMS patients was 5–8 cm (or 50-80 mm) on a 10-cm (100-mm) visual analog scale (16,27). The mean (± SD) intensity of pain in TN patients was reportedly approximately 6.96 ± 2.11 cm on a 10-cm visual analog scale (7). Our results support these earlier findings. In a comparison of BMS and TN using logistic regression analysis, the OR for worst pain intensity for BMS was half that for TN. However, the OR for somatization score among BMS patients was 3.8 times that of TN patients. A psychological component to BMS has been clearly identified during the last decade (3,28-30), and it has been suggested that somatic complaints from unfavorable life experiences associated with chronic pain may influence both individual personality and mood changes (30). Many BMS patients do indeed report one or more adverse life events in their clinical/social history, such as difficult infancy, inadequate parenting, poor adaptation to school and/or work, family or marital strife, or financial

problems (30). Differences in the basic characteristics of BMS and TN patients suggest the possibility of different psychosocial profiles. In fact, TN is one of the worst pain syndromes and is accompanied by severe limitations in daily activity (31); however, BMS patients also complain of similar limitations, as identified in this study.

Although pain intensity is more severe in TN than in BMS, the psychosocial impact of BMS is similar or worse than that of TN. Our findings indicate that pain intensity is not directly correlated with psychological impact, that continuous mild-to-moderate pain also has negative psychosocial effects on well-being, and that BMS patients may require pain control that targets the central nervous system or psychosocial characteristics.

Acknowledgments

This study was supported by a Nihon University Multidisciplinary Research Grant for 2012, and a Grant-in-Aid for Scientific Research (C 23592870) from the Japanese Society for the Promotion of Science.

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