Pain and Pain Behavior in Burning Mouth Syndrome: A Pain Diary Study

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Aims: *To characterize pain related to primary burning mouth syndrome (BMS) in terms of intensity, interference, and distress caused by the pain, as well as factors influencing the pain across a period of 2 weeks, and to study the use of coping and management strategies on a daily basis.* ***Methods:*** *Fifty-two female patients with primary BMS completed a 2-week pain diary. Pain intensity, interference, distress, and mood on a 0 to 10 numeric rating scale (NRS), as well as pain amplifying and alleviating factors, were recorded three times a day. The use of treatments (medication or other means) and coping strategies were recorded at the end of each day. Coefficient of variation, repeated measures analysis of variance, and correlative methods were used to assess the between- and within-subject variation, pain patterns, and associations between various pain scores.* ***Results:*** *The overall mean pain intensity score of the 14 diary days was 3.1 (SD: 1.7); there was considerable variation in pain intensity between patients. Most patients experienced intermittent pain. On average, pain intensity increased from the morning to the evening. Intercorrelations between pain intensity, interference, distress, and mood were high, varying between* $r_s = .75$ *and* $r_s = .93$ *(*$P < .001$*). Pungent or hot food or beverages, stress, and tiredness were the most frequently mentioned pain-amplifying factors. The corresponding pain-alleviating factors were eating, sucking pastilles, drinking cold beverages, and relaxation. Thirty (58%) patients used pain medication and 35% reported using other means to alleviate their BMS pain. There was large variation in the use of coping strategies between subjects.* ***Conclusion:*** *There were considerable differences in pain, in factors influencing the pain, and in pain behavior across BMS patients. This indicates that patient information and education as well as treatment of BMS pain should be individualized.*
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Burning mouth syndrome (BMS), also known as stomatodynia, is characterized by burning pain on the tongue or in other areas of the oral mucosa without visible oral mucosal lesions. BMS has long remained an enigmatic condition with poorly understood etiopathogenesis, but progress has been made since the distinction between the burning mouth syndrome (primary BMS) and the burning mouth symptom (secondary BMS).[1–3] In the latter condition, local or systemic etiologic factors can be identified, and their treatment results in resolution of the burning mouth symptom, whereas recent neurophysiological, psychophysical, and neuropathological studies

have provided evidence that primary BMS may be a chronic neuropathic pain condition.[4–7]

When a clinician confronts chronic pain conditions with no obvious cure, such as primary BMS pain, knowledge of the characteristics of the pain such as pain intensity and impact, temporal aspects, and factors influencing the pain is indispensable. Also, the importance of coping and self-help strategies in chronic orofacial pain is increasingly recognized.[8,9] Although primary BMS is in general terms described as an unremitting, disabling pain condition[2,3,10] that can impair the patient's quality of life,[11,12] studies on BMS pain characteristics have reported varying results.[13–20] At present it is not clear whether the variation in the pain descriptions reported reflects actual variability of BMS pain or whether it is due to possible inconsistencies in the patient materials studied. Earlier studies in particular may also have included patients with secondary BMS symptoms, not only primary BMS patients. Furthermore, in all previous studies, the estimate of pain intensity has been based on a single time or retrospective scoring, and not during a period of successive days. Retrospective scoring contains a risk of recall bias and may obscure individual differences, as it only examines relations between subjects. Today, prospective real-time assessment methods such as pain diaries are widely used to evaluate pain intensity and impact in many chronic pain conditions.[8,21–24]

The aims of this prospective cohort study were to characterize pain related to primary BMS in terms of intensity, interference, and distress caused by the pain as well as factors influencing the pain across a period of 2 weeks, and to study the use of coping and management strategies on a daily basis.

Materials and Methods

This study was a multicenter study with seven participating oral or dental clinics. Four of the clinics were hospital departments, and three were primary health care centers. All dentists participating in the study had received special training in orofacial pain. The study protocol was approved by the joint local ethics committee of Turku University Central Hospital and Turku University and by those of the participating centers.

All female patients who visited the study centers during a 1-year time period and who had had primary BMS pain for longer than 3 months were invited to participate in the study. To be included in the study, the BMS pain had to occur daily or almost daily. All included patients had been screened for disorders that may account for burning mouth-like symptoms (secondary BMS). Exclusion criteria included presence of oral candidiasis, hyposalivation, nutritional deficiencies, abnormal thyroid stimulating hormone (TSH) levels, fasting blood glucose or antinuclear antibody values, and any pathological changes of the oral mucosa. Before inclusion in the study, the patients gave their informed consent. Altogether, 52 patients fulfilling the criteria participated in the study.

During the intake visit, the patients were asked to fill in a baseline self-report questionnaire including questions on demographic data, general health, and use of medication as well as other possible pain problems. Details about BMS pain such as duration, pain location, and possible day rhythm were also gathered. In addition, patients were asked to give an estimate on a numerical rating scale (NRS) with extreme ratings of 0 = no pain and 10 = worst possible pain regarding the mean, worst, and least pain intensity during the last 6-month time period. The patients also completed the Finnish version of the McGill Pain Questionnaire (FPQ).[25]

All participating patients were given a paper-and-pencil diary to score pain variables for a period of 14 consecutive days starting immediately after the intake visit. In the diary, each day was divided into three periods: morning from 8 to 12 am, afternoon from 12 to 6 pm, and evening from 6 pm to bedtime. In addition, patients were asked to log each morning whether the BMS pain had caused any problems in falling asleep the previous night or disturbed their sleep during the night.

The items scored after each of the three periods were: *(1)* pain intensity, on a NRS with anchor points "no pain" and "worst possible pain"; *(2)* pain interference, on a NRS with anchor points "no pain" and "pain present such that I can't do anything"; *(3)* distress caused by the pain, on a NRS with anchor points of "not at all" and "very much"; *(4)* experienced mood, on a NRS with anchor points "very good" and "very bad." The range in all NRS scales was 0 to 10, with a higher score indicating more pain or more problems. Furthermore, the patients were asked to indicate the duration of the pain for each period, and to indicate factors that amplified and factors that alleviated the pain. For the former, the following alternatives were given: "pungent food or beverages," "hot food or beverages," "stress," "tiredness," "mood," or "some other factor, indicate what." For the latter, the alternatives were: "eating," "chewing gum or sucking pastilles," "cold food or beverages," "relaxation," or "some other factor, indicate what." The patients were instructed to score all these items at the end of each period, ie, three times per day during the 2 weeks, to avoid recall bias.

The patients were also asked about their use of treatments (medication or other means) that day, and about strategies that they had used to cope with the pain. The following items from the Daily Pain Coping Inventory[8,26,27] were proposed: *(1)* Did something to try to reduce the pain (direct action); *(2)* Thought about solutions to the pain or gathered information about it (cognitive coping); *(3)* Did something to help me relax (relaxation); *(4)* Diverted attention from pain by thinking about other things or engaging in some activity (distraction); *(5)* Tried to see the pain in a different light that made it seem more bearable (cognitive coping); *(6)* Expressed emotions to reduce my anxiety, frustration, or tension about the pain (emotional support); *(7)* Sought or found emotional support from loved ones, friends, or professionals (emotional support); *(8)* Sought or found spiritual support or comfort (emotional support).

Statistical Methods

SSPS (Statistical Package for the Social Sciences) version 15.0 and SAS 9.1 for Windows software were used for the analyses. Means, standard deviations (SD), ranges (R), and percentages were used to present the characteristics of the patients. To reflect the variations between and within the patients, coefficient of variation (CV) was used. The between-patient CV was expressed as the ratio between SD and mean of the whole study population. Within-patient variation, mean, and SD over all 42 different registration times for each patient were first calculated. With these values, an individual CV was formed for each patient.

The differences in the pain pattern between morning, afternoon, and evening were studied using repeated-measures analysis of variance. After the analyses of all three periods, pairwise analyses between morning and afternoon, morning and evening, and afternoon and evening were performed.

Intercorrelations between pain intensity, interference, distress, and mood as well as between coping strategies and pain intensity were analyzed using Spearman rank correlations (r_s). *P* values less than .05 were regarded as statistically significant.

Results

Compliance and Descriptive Information

Baseline data were missing totally or partially from four patients, and FPQ results from two patients. Completely filled diaries were received from 47 patients. In the five incomplete diaries, the maximum of incompletely filled diary days was 4.

Table 1 Baseline Sample and Pain Characteristics of 52 Female Patients with BMS Pain

	% of patients
Occurrence	
Daily	67
Almost daily	33
Day-rhythm	
Pain free in the morning	78
Constant pain	6
No special rhythm	16
Concomitant taste disturbance	41
Xerostomia	58
Pain site	
Tongue	96
Lips	34
Anterior palate	24
Cheek mucosa	16
Floor of mouth	14
Other (eg, gingival, pharynx)	21

Mean age: 63.1 y (SD 10.9, range 33–82).
Pain chronicity: 66.8 mo (SD 59.3, range 6–240).
Pain intensity during the last 6-month time period (NRS):
Mean: 5.0 (SD 1.9, range 1–10).
Minimum 1.8 (SD 1.9, range 0–8).
Maximum 7.2 (SD 2.1, range 1–10).

General Health. Twelve patients had no general health problems. Cardiovascular diseases were reported by 20 patients, 8 patients had hypothyroidism, 1 patient diabetes, 1 epilepsy, and 5 patients had asthma. Four patients reported reflux symptoms, but none of them connected the BMS symptoms with these. Six patients had a diagnosed depression. Two patients used tranquilizers, 6 used antidepressants, and 9 patients used sleep medication.

Nineteen patients reported other pain problems such as headache (6 patients), joint pain (7 patients), or fibromyalgia (4 patients). The number of other pain problems reported varied from 0 to 6 (mean 1.7, SD 1.3). As pain medications for these pains, 6 out of the 19 patients used nonsteroidal anti-inflammatory drugs (NSAIDs) or paracetamol, 2 had specific migraine medication, 1 patient used gabapentin, and 2 used tricyclic antidepressants.

Baseline Characteristics. Baseline characteristics are presented in Table 1. All except for 2 patients experienced pain in the tongue area, and in 41% of the patients the pain was restricted to the tongue.

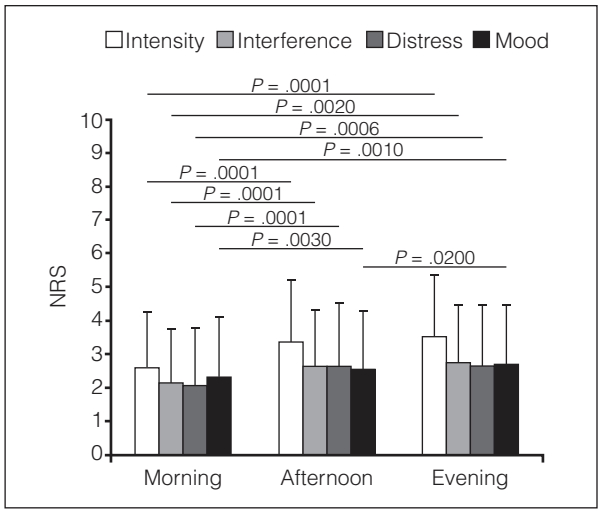

Fig 1 The mean (SD) pain intensity, interference, and distress caused by the pain and experienced mood at different registration periods.

Almost one-half (45%) of the patients experienced pain in several mucosal areas.

Thirty patients used pain medication for BMS pain; 19 patients used topical clonazepam, 6 patients used tricyclic antidepressants (mainly low-dose nortriptyline), 4 patients used pregabalin, and 1 patient used a combination of low-dose pregabalin and nortriptyline.

The word most frequently chosen from the FPQ was *burning*, which was chosen by 71% of the patients. The next frequently chosen words were *troublesome* (58%), *stinging* (54%), *pricking* (48%), and *throbbing* (44%).

Diary

Sleep. Almost half of the patients (46%) reported no difficulties in falling asleep because of the BMS pain during any of the diary days. However, a small amount of patients (15%) experienced difficulties in falling asleep because of the pain during more than half of the diary days.

Most patients (70%) reported no sleep disturbance because of the pain, 20% of the patients reported sleep disturbance during 1 or 2 nights in the 2-week period, and only one patient reported pain-related sleep disturbances during more than half of the registration times.

General Pain Level and Fluctuation Between Patients. According to the diary results, all 52 patients experienced BMS pain during all registration times with one exception: one of the patients was pain free during one morning registration period. The overall mean pain intensity NRS score in the diaries was 3.1 (SD: 1.7, range 0.24–8.22). The relatively large ratio between SD and mean NRS score (CV), 0.53, reflects a considerable variation of mean pain intensity between patients. For example, depending on the time of the day, 25% to 40% of the patients experienced mild pain (NRS ≤ 2), but in 8% to 14% of the patients, the pain was severe (NRS ≥ 5).

Within-Patient Pain Variation. When the SD values around the mean NRS score were subsequently averaged across all patients, an overall mean SD value of 1.37 was obtained, and the SD value around this mean was 0.62. The CV of these was 0.45, showing that the intraindividual variation of pain intensity was somewhat more limited compared to the variation between patients.

Pain Patterns During the Day. The average diary ratings of pain intensity increased from morning to evening (morning NRS mean [SD]: 2.6 [1.7], afternoon: 3.4 [1.9], evening: 3.5 [1.9]). The differences between morning and afternoon pain intensity and morning and evening pain intensity were statistically significant (Fig 1). On average, the pain also caused less interference in the morning (NRS mean [SD] 2.1 [1.6]) compared to the afternoon (2.6 [1.7]) or the evening (2.8 [1.7]). Average ratings of distress caused by the pain increased during the day (morning NRS mean [SD] 2.1 [1.7], afternoon mean 2.6 [1.9], evening mean 2.7 [1.8]).The experienced mood deteriorated during the day (morning NRS mean [SD] 2.3 [1.8], afternoon 2.5 [1.8], evening 2.7 [1.8]). Intercorrelations between pain intensity, interference, distress and mood were high, varying between $r_s = .75$ and $r_s = .93$ ($P < .001$).

Despite the general tendency of the pain intensity to increase during the day, considerable variations in daily pain intensity patterns between patients were found. Eight patients experienced their pain as

Table 2 Pain-Amplifying and Pain-Alleviating Factors

Variable	Patients (n)	Mean*	SD	Range	CV
Amplifying factors					
Pungent food or beverages	52	8.40	9.70	1–40	1.15
Hot food or beverages	32	13.47	12.68	1–42	0.94
Stress	26	7.23	9.14	1–42	1.26
Tiredness	27	9.48	9.04	1–42	0.95
Mood	26	7.62	9.46	1–42	1.24
Some other factor	20	8.75	9.63	1–33	1.10
Alleviating factors					
Eating	31	14.29	11.95	1–42	0.83
Chewing gum/pastilles	39	16.87	12.91	1–42	0.76
Cold food or beverages	40	16.88	14.29	1–42	0.84
Relaxation	28	11.14	8.53	1–30	0.76
Some other factor	29	11.59	10.23	1–37	0.88

*Mean number of times the factor was mentioned in the diary (maximum 42).

Table 3 Daily Use of Pain-Coping Strategies

Variable	Patients (n)	Mean*	SD	Range	CV
Did something to try to reduce the pain.	49	11.10	4.13	1–14	0.37
Thought about solutions to the pain or gathered information about it.	28	5.29	4.63	1–14	0.87
Did something to help me relax.	38	8.53	4.52	1–14	0.53
Diverted attention from pain by thinking about other things or engaging in some activity.	46	9.98	4.20	1–14	0.42
Tried to see the pain in a different light that made it seem more bearable.	41	7.63	5.08	1–14	0.66
Expressed emotions to reduce my anxiety, frustration, or tension about the pain.	29	5.14	4.22	1–14	0.82
Sought or found emotional support from loved ones, friends, or professionals.	17	6.18	5.13	1–14	0.83
Sought or found spiritual support or comfort.	29	5.24	4.47	1–14	0.85

*Mean number of times the strategy was used (maximum 14).

most intense in the morning and eight patients reported most intense pain in the afternoon. In seven cases, the BMS pain intensity stayed about the same all day long.

Problems with falling asleep correlated with afternoon pain intensity (r_s = .42, P = .002), and even more strongly with evening pain intensity (r_s = .52, P < .001), but there was no correlation between pain intensity and actual sleep quality.

Pain Duration. Most patients experienced intermittent pain; the pain lasted on average for 2.2 hours (SD: 1.2) in the morning, 3.6 hours (SD: 1.8) in the afternoon, and 3.1 hours (SD: 1.4) in the evening. Mean pain duration across diary days was 8.8 (SD: 4.1) hours, range 0.21 to 15.71 hours.

Pain-Amplifying and Pain-Alleviating Factors. Table 2 presents pain amplifying and alleviating factors mentioned by the patients at the 42 different registration times and the number of patients presenting each factor. Among the alternative "some other amplifying factor," talking and xerostomia were the most frequently mentioned factors, whereas distraction in different forms, as well as local remedies like the use of cooking oil or chamomile tea,

were mentioned as other pain-alleviating factors. The CV varied between 0.76 and 1.26 and showed a large disparity in pain-influencing factors. There was especially great between-subject variation in reporting "stress" and "mood" as pain-amplifying factors.

Pain Treatment. Thirty (58%) patients used pain medication for their BMS pain. Out of these, 18 used it on a daily basis, 4 almost everyday, and the rest irregularly. Eighteen patients (35%) reported using other means to alleviate the pain, such as sucking pastilles or chewing gum, or rinsing the mouth with cold water or mouthwash, and a few also used more psychologically oriented means such as distraction or relaxation. Two-thirds of the patients using these means used them during more than half of the registration days. Five of the BMS patients used no pain medications or other means to ease the pain.

Daily Pain Coping

Table 3 depicts the use of different pain-coping strategies. From the different coping strategies, direct action ("Did something to try to reduce the pain") was used by most patients and most frequently. Also distraction, cognitive coping ("Tried to see the pain in a different light that made it seem more bearable"), and relaxation were strategies used by most patients, whereas strategies within the emotional support scale were used least frequently. The between-subject variation in the use of coping strategies was especially large concerning the last-mentioned strategy scale. The way different coping strategies were used correlated with pain intensity; patients experiencing more intense pain used coping strategies "Thought about solutions to the pain or gathered information about it" (r_s = .41, P = .003), "Did something to help me relax" (r_s = .34, P = .014), and "Expressed emotions to reduce my anxiety, frustration, or tension about the pain" (r_s = .33, P = .016) more often than patients with less intense pain. The total number of strategies used associated significantly and positively with pain intensity (r_s = .40, P = .003), interference (r_s = .49, P < .001), distress (r_s = .55, P < .001), and mood (r_s = .34, P = .015).

Discussion

The main aim of the present pain diary study was to gain accurate information about the BMS pain experience. Knowledge of the intensity and impact, as well as of factors influencing the pain or means of daily treatment or coping with pain, is relevant in terms of patient information and education, and for optimal treatment. Taking into account the psychological or psychiatric vulnerability often associated with BMS pain,[3,10,28] patient information is considered to be imperative for enhancing patients' psychosocial functioning and coping with pain, but it seems to be often neglected by clinicians.[1,15]

The findings of the present study illustrate that there are large individual variations in BMS pain intensity and impact, in factors influencing the pain, and in the use of coping strategies and the ways the patients treat their pain. As regards the intensity of pain, there was a considerable variation of mean pain sensation between patients, eg, depending on the time of the day, about 25% to 40% of the patients experienced mild pain (NRS ≤ 2), but in some 8% to 14% of the patients, the pain was severe (NRS ≥ 5).

In earlier studies, the mean BMS pain intensity has been reported to vary from about 4 to 5.5 on a 0 to 10 pain scale.[14,17–20,29] This is in keeping with the retrospective report of the mean pain intensity by the present patients at the baseline visit. However, the mean pain intensity calculated by taking the average of all pain scores across the 14 diary days was lower. The difference in pain intensity in retrospective compared with diary measures may be influenced by the differences in the rating periods (6 months versus 14 days), but it may also reflect inaccuracies in retrospective reporting; inflation of reports of pain based on memory have been a common finding in studies comparing diary and retrospective pain intensity ratings.[23,30] Compared to the results of a pain diary study on another orofacial pain problem, the myogenous temporomandibular disorder, BMS pain is experienced as equally intensive: myogenous face pain has a mean 2.9 (SD: 1.9) diary score for pain intensity.[22]

BMS patients usually have negligible symptoms when they wake up. According to the baseline self-report questionnaire, 78% of the present patients reported being pain free early in the morning. The BMS symptoms have been reported to gradually increase during the day to culminate in the evening,[13,15] or patients are described to have continuous symptoms,[17,18,29] or to suffer from symptoms both day and night.[15,19] The present diary results indicated that, on average, the pain intensity increased from the morning to the evening, but individual patterns appeared; close to half of the patients experienced less pain in the evening compared to the morning or afternoon, or experienced even pain intensity all day long. Less than a third of the patients were disturbed by the pain at nighttime, most of them only occasionally. Furthermore, most

patients experienced intermittent pain with a mean pain duration from 2.2 hours to 3.6 hours per registration period. The periodicity of the pain might reflect the contribution of various pain-influencing factors in provoking the pain.

In addition to pain intensity, the psychosocial consequences of pain should also be assessed to gain a comprehensive picture of the patient's pain problem, and the varying impact of BMS pain should be taken into account when treating BMS patients. In the present study, patients were asked to give their estimate, using NRS scales, of how much the pain interfered with everyday life, as well as on possible psychological distress connected with the pain and the experienced mood. The mean NRS values of all these variables were quite low, but again, there were great individual differences in pain impact and experienced mood. All these variables correlated significantly with pain intensity ratings. An increase in negative effects concurrently with increased pain intensity is a well-known phenomenon in different pain conditions.[21,31]

The complex and obviously reciprocal interrelationships between pain problems and sleep disturbances have received increasing attention in pain treatment and research during recent years[27,32] and deserve attention also in BMS pain. Up to two-thirds of BMS patients have been reported to suffer from problems in falling asleep or to wake up during the night,[13,15] but according to some studies, the reported sleep disturbances may not be directly related to BMS pain.[13] In the present study, where patients were directly asked whether BMS pain caused any problems in falling asleep or disturbed the sleep during the previous night, 46% and 70%, respectively, reported having experienced no pain-related disturbances in any of the 14 nights. However, a small number of patients (15%) experienced difficulties in falling asleep because of the pain in more than half of the diary days. More serious pain-related sleep disturbances were rare; only one patient reported pain-related sleep disturbances in more than half of the registration times. No inference as to the relative severity of the sleep disturbance in BMS can be drawn due to lack of control subjects.

Some earlier studies have suggested that certain factors can increase or alleviate BMS pain, and this knowledge was used in the present study when formulating the pain diary questions about these factors. As in other studies, local factors such as spicy or hot food or beverages[13,15,29,32] or psychological factors such as stress or tiredness[13] were mentioned by the patients most often as factors increasing the pain. Interestingly, there is recent evidence that in some cases the pain mechanisms involved in primary BMS may be predominantly peripheral, but in some cases more central mechanisms are involved.[34] Whether the pain-provoking factors differ with the main pain mechanisms has not been studied. The same may also concern the pain-alleviating factors; factors such as eating, chewing gum, or cold food or beverages were frequently mentioned by the present study's patients, but also relaxation and distraction were marked down as pain-alleviating factors, as in earlier studies.[13] A considerable proportion (35%) of the patients in the present study reported using these as a means to treat their BMS pain.

Pain-coping strategies assessed in the present study were adapted from a pain diary study on TMD pain.[8] Like TMD pain patients, BMS patients most frequently used direct action ("Did something to try to reduce pain") to cope with their pain. Also distraction and a form of cognitive coping ("Tried to see the pain in a different light that made it seem more bearable") as well as relaxation were strategies used by most patients. The strategies used by the patients varied, and the between-subject variation was large especially concerning the use of strategies within the emotional support scale. Increases in pain intensity were found to influence the way individual coping strategies were used, and to increase the number of coping strategies used, which is in line with findings from other studies.[8] Concurrent use of multiple pain-coping strategies was consistent with findings in other pain populations.[8,35]

A little more than half of the present patients used pain medication for their BMS pain, mostly topical clonazepam, tricyclic antidepressants, or gabapentinoids. The use of these pain medications is in line with the evidence from randomized placebo-controlled trials in BMS,[36,37] or reflects the current clinical practice influenced by research evidence on the use of pain medications in other neuropathic type of pains.[38] The use of pain medications was not regular in all cases, and there was day-to-day variation, eg, in the number of times per day when topical clonazepam was used, probably reflecting the varying need for pain alleviation due to the fluctuation in the intensity of BMS pain. Indeed, topical clonazepam which can be used on the prn (as needed) basis seems to offer an especially suitable alternative to medicate BMS pain. However, not all patients experienced pain relief when using locally acting clonazepam, which probably is effective in only patients whose pain is due to peripheral neuropathy.[34] The observation that almost half of the patients did not use any pain medication is also clinically relevant. Many of these patients obtained relief through chewing gum or sucking pastilles or

rinsing the mouth with cold water, etc. The pain-relieving effect of these is known already from early studies on BMS pain.[33] Furthermore, about 10% of the patients did not use any type of pain-relieving means during the 14-day diary period.

The patient material in the present study consisted of carefully diagnosed patients with primary BMS pain. Because women are much more frequently affected by BMS than men[19] and there is an especially strong female preponderance among patients seeking professional help for BMS symptoms,[2] and because there might be gender-related differences in pain expression,[39] the present study focused only on female BMS patients. The present patients showed a high degree of compliance in diary recording (97% completely scored diary days), ensuring the credibility of the study results.

Baseline pain characteristics such as pain location, symptom duration, frequency of concomitant xerostomia or taste disturbance, as well as the age distribution of the patients were similar to other BMS patient materials.[3,10] The word most frequently chosen from the FPQ by the present patients to describe the character of the BMS pain was *burning*, which is comparable to earlier findings from studies using McGill descriptions.[14,18] In addition to BMS pain, many patients suffered from other pain problems as well as from other health problems, which also parallels results from earlier studies.[18,40,41]

The results of the present study have several clinical implications. Understanding the individually varying intensity and impact of BMS pain emphasizes the importance of an in-depth assessment of the characteristics of the individual BMS patient's pain in order to tailor the patient information and treatment approach accordingly. Pain diaries may well be used also in routine clinical work to gather information on pain intensity and impact. Knowledge of factors influencing BMS pain is important when instructing patients to avoid factors known to commonly increase the pain, or to use means that are known to reduce the pain. While the present results suggest that BMS pain is periodic, it may be that different local factors have an important role in provoking the pain, and by avoiding these, the patients might be able to somewhat influence their pain experience. Using means that generally are reported to ease the pain might enhance coping with the pain. The interindividual variation in pain intensity emphasizes the individual need for pain medication; BMS pain may be so mild that there is no need for pharmacologic treatment. Furthermore, the intraindividual variation in pain intensity suggests that topical clonazepam, which can be used on the prn (as needed) basis, might be the optimal medication for BMS pain, taking into consideration nonetheless the current understanding that clonazepam is effective only in cases where the BMS pain is due to peripheral neuropathy. As a whole, appropriate use of treatment or self-care strategies, as well as individual coping strategies, might enhance treatment outcomes and patients' psychosocial functioning and coping with BMS pain.

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References

1. Zakrzewska JM. The burning mouth syndrome remains an enigma. Pain 1995;62:253–257.
2. Woda A, Pionchon P. A unified concept of idiopathic orofacial pain: Clinical features. J Orofac Pain 1999;13:172–184.
3. Scala A, Checchi L, Montevecchi M, Marini I. Update on burning mouth syndrome: Overview and patient management. Crit Rev Oral Biol Med 2003;14:275–291.
4. Forssell H, Jääskeläinen S, Tenovuo O, Hinkka S. Sensory dysfunction in burning mouth syndrome. Pain 2002;99:41–47.
5. Lauria G, Majorana A, Borgna M, et al. Trigeminal small-fiber sensory neuropathy causes burning mouth syndrome. Pain 2005;115:332–337.
6. Yilmaz Z, Renton T, Yiangou Y, et al. Burning mouth syndrome as a trigeminal small fibre neuropathy: Increased heat and capsaicin receptor TRPV1 in nerve fibres correlates with pain score. J Clin Neurosci 2007;14:864–871.
7. Penza P, Majorana A, Lombardi R, et al. "Burning tongue" and "burning tip": The diagnostic challenge of the burning mouth syndrome. Clin J Pain 2010;26:528–532.
8. Aaron LA, Turner JA, Mancl LA, Sawchuk CN, Huggins KH, Truelove EL. Daily pain coping among patients with chronic temporomandibular disorder pain: An electronic diary study. J Orofac Pain 2006;20:125–137.
9. Brister H, Turner JA, Aaron LA, Mancl L. Self-efficacy is associated with pain, functioning, and coping in patients with chronic temporomandibular disorder pain. J Orofac Pain 2006;20:115–124.
10. Lynge Pedersen AM, Smidt D, Nauntofte B, Jerlang Christiani C, Bjornsson Jerlang B. Burning mouth syndrome: Etiopathogenic mechanisms, symptomatology, diagnosis and therapeutic approaches. Oral Biosci Med 2004;1:3–19.
11. Lopez-Jornet P, Camacho-Alonso F, Lucero-Berdugo M. Quality of life in patients with burning mouth syndrome. J Oral Pathol Med 2008;37:389–394.
12. Ni Riordain R, Moloney E, O'Sullivan K, McCreary C. Burning mouth syndrome and oral health-related quality of life: Is there a change over time? Oral Diseases 2010;16:643–647.
13. Grushka M. Clinical features of burning mouth syndrome. Oral Surg Oral Med Oral Pathol 1987;63:30–36.
14. Grushka M, Sessle BJ, Miller R. Pain and personality profiles in burning mouth syndrome. Pain 1987;28:155–167.
15. van der Ploeg HM, van der Waal N, Eijkman MAJ. Psychological aspects of patients with burning mouth syndrome. Oral Surg Oral Med Oral Pathol 1987;63:664–668.

16. Lamey P-J, Lamb AB. Prospective study of aetiological factors in burning mouth syndrome. Br Med J 1988; 296:1243–1246.
17. Eli I, Baht R, Littner MM, Kleinhauz M. Detection of psychopathological trends in glossodynia patients. Psychosom Med 1994;56:389–394.
18. Svensson P, Kaaber S. General health factors and denture function in patients with burning mouth syndrome and matched controls. J Oral Rehabil 1995;22:6887–6895.
19. Bergdahl M, Bergdahl J. Burning mouth syndrome: Prevalence and associated factors. J Oral Pathol Med 1999;28:350–354.
20. Carlson CR, Miller CS, Reid KI. Psychosocial profiles of patients with burning mouth syndrome. J Orofac Pain 2000;14:59–64.
21. Litt MD, Shafer D, Napolitano C. Momentary mood and coping processes in TMD pain. Health Psychol 2004;23:354–362.
22. van Grootel RJ, van der Glas HW, Buchner R, de Leeuw JRJ. Patterns of pain variation related to myogenous temporomandibular disorders. Clin J Pain 2005;21:154–165.
23. Lewandowski AS, Palermo TM, Kirchner HL, Drotar D. Comparing diary and retrospective reports of pain and activity restriction in children and adolescents with chronic pain conditions. Clin J Pain 2009;25:299–306.
24. Chiros C, O'Brien WH. Acceptance, appraisals, and coping in relation to migraine headache: An evaluation of interrelationships using daily diary methods. J Behav Med 2011;34:307–320.
25. Ketovuori H, Pöntinen PJ. A pain vocabulary in Finnish. The Finnish pain questionnaire. Pain 1981;11:247–253.
26. Stone AA, Neale JM. New measure of daily coping: Development and preliminary results. J Pers Soc Psychol 1984;46:892–906.
27. Affleck G, Urrows S, Tennen H, Higgins P, Abeles M. Sequential daily relations of sleep, pain intensity, and attention to pain among women with fibromyalgia. Pain 1996;68:363–368.
28. Taiminen T, Kuusalo L, Lehtinen L, et al. Psychiatric (axis I) and personality (axis II) disorders in patients with burning mouth syndrome and atypical facial pain. Scand J Pain 2011;2:155–160.
29. Bergdahl J, Anneroth G, Perris H. Personality characteristics of patients with resistant burning mouth syndrome. Acta Odontol Scand 1995;53:7–11.
30. van den Brink M, Bandell-Hoekstra EN, Abu-Saad HH. The occurrence of recall bias in pediatric headache: A comparison of questionnaire and diary data. Headache 2001;41:11–20.
31. Zautra A, Smith B, Affleck G, Tennen H. Examinations of chronic pain and affect relationships: Applications of a dynamic model of affect. J Consult Clin Psychol 2001; 69:786–795.
32. Svensson P, Baad-Hansen L, Arima T. Association of orofacial pain conditions and sleep disturbance. In: Lavigne G, Cistulli PA, Smith MT (eds). Sleep Medicine for Dentists: A Practical Overview. Chicago: Quintessence, 2009:167–174.
33. Zilli C, Brooke RI, Lau CL. Screening for psychiatric illness in patienst with oral dysesthesia by means of general health questionnaire-twenty-eight item verion (GHQ-28) and the irritability, depression and anxiety scale (IDA). Oral Surg Oral Med Oral Pathol 1989;67:384–389.
34. Gremeau-Richard C, Dubray C, Aublet-Cuvelier B, Ughetto S, Woda A. Effect of lingual nerve block on burning mouth syndrome (stomatodynia): A randomized crossover trial. Pain 2010;149:27–32.
35. Bluth FM, March LM, Nicholas MK, Cousins MJ. Self-management of chronic pain: A population-based study. Pain 2005;113:285–292.
36. Gremeau-Richard C, Woda A, Navez ML, et al. Topical clonazepam in BMS: A randomized placebo-controlled study. Pain 2004;108:51–57.
37. Zakrzewska JM, Forssell H, Glenny AM. Interventions for the treatment of burning mouth syndrome. Cochrane Database of Systematic Reviews 2005, issue 1. Art. No.: CD002779. DOI: 10.1002/14651858.CD002779.pub2.
38. Forssell H, Svensson P. Atypical facial pain and burning mouth syndrome. In: Cervero F, Jensen TS (eds). Handbook of Clinical Neurology, vol 81. Amsterdam: Elsevier, 2006:597–608.
39. Greenspan JD, Craft RM, LeResche L, et al. Studying sex and gender differences in pain and analgesia: A consensus report. Pain 2007;132(suppl 1):S26–S45.
40. Lamey P-J, Freeman R, Eddie S-A, Pankhurst C, Rees T. Vulnerability and presenting symptoms in burning mouth syndrome. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2005;99:48–54.
41. Mignogna MD, Pollio A, Fortuna G, et al. Unexplained somatic comorbidities in patients with burning mouth syndrome: A controlled clinical study. J Orofac Pain 2011;25:131–140.