

# Dentist Practice Patterns and Therapeutic Confidence in the Treatment of Pain Related to Temporomandibular Disorders in a Dental Practice-Based Research Network

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**Aims:** To quantify the practice patterns of Japanese dentists in the management of pain related to temporomandibular disorders (TMD) and to identify specific characteristics that are significantly associated with the decision to perform occlusal adjustment for TMD-related pain. **Methods:** A cross-sectional study was conducted consisting of a questionnaire survey of dentists affiliated with the Dental Practice-Based Research Network Japan (JDPBRN) ( $n = 148$ ). Participants were asked how they diagnosed and treated TMD-related pain. Associations between dentist characteristics and the decision to perform occlusal adjustment were analyzed via multiple logistic regression. **Results:** A total of 113 clinicians responded to the questionnaire (76% response rate), and 81% of them ( $n = 89$ ) had treated TMD during the previous year. Dentists treated an average of  $1.9 \pm 1.8$  (mean  $\pm$  SD) patients with TMD-related pain per month. Most JDPBRN dentists used similar diagnostic protocols, including questions and examinations. The most frequent treatments were splints or mouthguards (96.5%), medications (84.7%), and self-care (69.4%). Occlusal adjustment for TMD-related pain was performed by 58% of the participants. Multiple logistic regression analysis identified two factors significantly associated with the decision to perform occlusal adjustment: dentist lack of confidence in curing TMD-related acute pain (odds ratio [OR] 5.60; 95% confidence interval [CI] 1.260 to 24.861) and proportion of patients with severe TMD-related pain (OR 0.95; 95% CI 0.909 to 0.999). **Conclusion:** The most common treatments for TMD-related pain were reversible treatments; however, over half of the dentists performed occlusal adjustment for TMD-related pain. The results of this study suggest that an evidence-practice gap exists for occlusal adjustment for TMD-related pain. *J Oral Facial Pain Headache* 2017;31:152–158. doi: 10.11607/ofph.1730

**Keywords:** evidence-practice gap, practice pattern, practice-based research, temporomandibular disorders

Temporomandibular disorders (TMD) are one of the most common musculoskeletal pain conditions, affecting approximately 5% to 12% of the United States population<sup>1</sup> and 3% of the Japanese population.<sup>1,2</sup> Currently, initial treatment modalities for the management of TMD-related pain are considered to be self-care, pharmacologic pain control, physical therapy, and splint therapy<sup>3</sup>; however, the initial management of TMD-related pain for general dentists has not been standardized. On the basis of a recent study conducted by the Dental Practice-Based Research Network (DPBRN), now referred to as the National Dental PBRN (<http://NationalDentalPBRN.org>), significant differences in clinical practices of TMD-related pain were noted between dentists as well as between different geographic regions in the network.<sup>1</sup> Although the National Dental PBRN clinical practice guideline<sup>4</sup> recommends that occlusal adjustment not be performed as the initial treatment for TMD because of its irreversibility and uncertainty of effectiveness, 64% of United States dentists have reported using occlusal adjustment in their clinical practice.<sup>1</sup> However, the relationships between occlusal adjustment for TMD-related pain and specific dentist characteristics have not been clarified.

The recent establishment of the Dental Practice-Based Research Network Japan (JDPBRN) has created an opportunity for international

comparisons. JDPBRN is a consortium of dental practices with a broad representation of practice types, treatment philosophies, and patient populations and has a shared mission with the US National Dental PBRN.<sup>5</sup> Previous studies by the US National Dental PBRN<sup>6–10</sup> and JDPBRN,<sup>11–16</sup> which included practitioners from the US, Scandinavia, and Japan, revealed substantial variation between dentists in caries treatment,<sup>6,7,11,14</sup> caries risk assessment,<sup>9,10,15</sup> dietary counseling,<sup>12</sup> and caries prevention.<sup>8,13,16</sup> However, practice patterns for TMD-related pain have not yet been examined in Japan.

The objectives of this study were to: (1) quantify the practice patterns of Japanese dentists in the management of pain related to TMD; and (2) identify specific characteristics that are significantly associated with the decision to perform occlusal adjustment for TMD-related pain.

## Materials and Methods

### Study Design

This was a cross-sectional study consisting of a questionnaire survey. The study was approved by the Institutional Review Board of Kyushu Dental University (No. 13-73) and was conducted in accordance with the World Medical Association (WMA) Declaration of Helsinki. All participants provided informed consent prior to participation in this study.

### Participants

The study queried dentists who worked in outpatient dental practices and who were affiliated with the JDPBRN ( $n = 148$ ). Participants were recruited from the JDPBRN website (<http://www.dentalpbrn.jp/>) and by targeted mailing. The network regions of the JDPBRN represent all seven major districts of Japan (Hokkaido, Tohoku, Kanto, Chubu, Kansai, Chugoku-Shikoku, and Kyushu). Every region had a Regional Coordinator who distributed and gathered the questionnaires. Participants were asked to complete the questionnaire by hand and return it to the assigned Regional Coordinator in a preaddressed envelope. Upon receipt, the Regional Coordinator reviewed the questionnaire for completeness.<sup>11</sup>

### Questionnaire

The questionnaire used was the same as that developed in previous studies by the US National Dental PBRN.<sup>1</sup> Four dentists and clinical epidemiologists translated these questionnaires into Japanese and added several questions about dentist and patient characteristics. The final version of this questionnaire is available at <http://www.dentalpbrn.jp/image/study2questionnaire.pdf>. Participants were asked

about (1) how often they treated patients with TMD-related pain; (2) the frequency of specific questions and examination items used to diagnose TMD; (3) treatment modalities for TMD-related pain, including occlusal adjustment; (4) type of splints, medications, and self-care instruction for treating pain related to TMD; and (5) specific characteristics of dentists and patients.

### Statistical Analyses

A descriptive analysis was performed, and means, standard deviations (SDs), and frequencies were reported. The numbers and percentages of JDPBRN dentists who treated TMD-related pain were determined for demographics, TMD-related pain diagnostic protocol, and treatments. The multiple-choice answers “never,” “sometimes,” “half of the time,” “usually,” and “always” were categorized into “never,” “sometimes or half of the time,” and “usually or always.” Multiple unconditional logistic regression analysis was then conducted to examine the relationship between independent variables and the performance of occlusal adjustment for TMD-related pain as a dependent variable. Independent variables were gender, years since graduation from dental school, dentist confidence in curing TMD-related acute pain, proportion of patients with severe TMD-related pain, and number of TMD pain patients treated per month. Odds ratios (ORs) were calculated together with 95% confidence intervals (CIs). Statistical significance was set at  $P < .05$ . All statistical analyses were performed with IBM SPSS Statistics (version 19.0, IBM Corporation).

## Results

Questionnaires were distributed to 148 dentists, and 113 responses (76.4% response rate) were collected. All participants were Asian, 83.6% ( $n = 92$ ) were male, and 80.9% ( $n = 89$ ) had treated TMD over the last 12 months. The mean  $\pm$  SD number of years since graduation from dental school was  $19.4 \pm 11.0$ . The mean number of patients with TMD-related pain that dentists treated per month was  $1.9 \pm 1.8$ . Values related to the dentists' therapeutic confidence in curing patients with TMD-related acute pain within 6 months of onset were 31.5% ( $n = 28$ ) for confident, 43.8% ( $n = 39$ ) for neither agree nor disagree, and 24.7% ( $n = 22$ ) for not confident. Of the most common symptoms that TMD patients usually or always reported, jaw pain accounted for 68.1% ( $n = 60$ ), problems with opening or closing the mouth for 59.8% ( $n = 52$ ), and temporomandibular joint (TMJ) noises for 51.7% ( $n = 45$ ). The mean proportion (%) of patients with severe TMD-related pain was  $10.7 \pm 11.5$  (Table 1).

**Table 1 Distribution of Dentist, Practice, and Patient Characteristics of Participants (n=113)**

	n (%) or mean $\pm$ SD
<b>Dentist characteristics</b>	
Years since graduation from dental school (n = 107), mean $\pm$ SD	19.4 $\pm$ 11.0
Gender (male) (n = 110), n (%)	92 (83.6)
Race/ethnicity (Asian) (n = 110), n (%)	110 (100)
Dentists who treated TMD over the last 12 months (n = 110), n (%)	89 (80.9)
Number of patients with TMD-related pain per month (n = 89), mean $\pm$ SD	1.9 $\pm$ 1.8
Therapeutic confidence in curing patients with TMD-related acute pain within 6 months of onset (n = 89), n (%)	
Confident	28 (31.5)
Neither agree nor disagree	39 (43.8)
Not confident	22 (24.7)
<b>Practice setting</b>	
Type of practice (n = 87), n (%)	
Employed by another dentist	40 (46.0)
Self-employed without partners and without sharing of income, costs, or office space	35 (40.2)
Other	12 (13.8)
City population (government ordinance-designated city) (n = 86)	34 (39.5)
<b>Patient characteristics</b>	
Symptoms reported by TMD pain patients, n (%)	
Jaw pain (n = 88)	60 (68.1)
Problem with opening or closing the mouth (n = 87)	52 (59.8)
TMJ noises (n = 87)	45 (51.7)
Catching or locking of the jaw (n = 87)	33 (37.9)
Facial pain (n = 88)	23 (26.1)
Headache (n = 88)	14 (15.9)
Earache (n = 87)	4 (4.6)
Patients with TMD pain for 6 months or more (n = 87), mean (%) $\pm$ SD	26.3 $\pm$ 21.2
Proportion of severity of TMD-related pain (n = 88), mean (%) $\pm$ SD	
Mild	55.5 $\pm$ 24.1
Moderate	33.7 $\pm$ 19.1
Severe	10.7 $\pm$ 11.5
Patient age distribution (n = 87), mean (%) $\pm$ SD	
1–18 y	14.3 $\pm$ 8.7
19–44 y	28.2 $\pm$ 12.3
45–64 y	30.5 $\pm$ 10.6
65+ y	27.5 $\pm$ 14.5

### TMD Diagnostic Protocol

The frequency of specific questions asked and examination protocols used are shown in Table 2. The most frequent questions dentists usually or always asked were “Do you have pain in your temples, face, jaw joint, or jaws?” and “Do you have pain when you open your mouth wide?”, which were both at 98.9% (n = 88). The most frequent examinations dentists usually or always performed were palpation of TMJ at 96.6% (n = 84) and limitation of range of motion and palpation of jaw muscles, both at 92.0% (n = 80).

### Treatment for Pain Related to TMD

Table 3 shows the most frequently provided treatment for TMD-related pain. The most common treatments the participants recommended were splints or mouthguards (96.5%, n = 82), over-the-counter (OTC) or prescription medications (84.7%, n = 72), and self-care (69.4%, n = 59). A total of 57.6% of the participants (n = 49) indicated that they would

perform occlusal adjustment for TMD-related pain. In contrast, the lowest proportion of dentists indicated referral to a physical therapist (4.7%, n = 4).

### Type of Splints, Medications, and Self-care Instruction for Treating Pain Related to TMD

The most commonly recommended type of splint was a hard custom mouthguard (usually or always: 40.0%, n = 34), followed by a soft custom splint (19.3%, n = 16). Among the prescription medications, dentists most frequently recommended loxoprofen sodium (37.9%, n = 33), diclofenac sodium (8.5%, n = 7), and ibuprofen (7.2%, n = 6); OTC medications sold directly to a consumer without a prescription from a health care professional were rarely recommended. Regarding self-care, avoid clenching or grinding teeth was most commonly recommended by dentists (75.0%, n = 66), followed by relax your jaw (muscles) (64.8%, n = 57) and identify pain triggers (59.8%, n = 52) (Table 4).

**Table 2** Frequency of Specific Questions and Examination Items Used by Dentists to Diagnose TMD

	Usually/always, n (%)	Sometimes/half of time, n (%)	Never, n (%)
<b>Questions</b>			
Do you have pain in your temples, face, jaw joint, or jaws? (n = 89)	88 (98.9)	1 (1.1)	0 (0)
Do you have pain when you open your mouth wide? (n = 89)	88 (98.9)	1 (1.1)	0 (0)
Do you have pain when you chew? (n = 89)	79 (88.8)	9 (10.1)	1 (1.1)
Do you have pain when you are clenching or grinding your teeth? (n = 88)	70 (79.5)	14 (15.9)	4 (4.5)
<b>Examinations</b>			
Palpation of TMJ (n = 87)	84 (96.6)	3 (3.4)	0 (0)
Palpation of jaw muscles (n = 87)	80 (92.0)	7 (8.0)	0 (0)
Limited range of motion (n = 87)	80 (92.0)	5 (5.7)	2 (2.3)
Presence of pain with range of motion (n = 87)	79 (90.8)	5 (5.7)	3 (3.4)
TMJ noises (n = 87)	75 (86.2)	10 (11.5)	2 (2.3)
Occlusal state (n = 87)	77 (88.5)	9 (10.3)	1 (1.1)

### Factors Affecting a Dentist Decision to Perform Occlusal Adjustment for Pain Related to TMD

Multiple logistic regression analysis identified two factors significantly associated with the decision to perform occlusal adjustment (Table 5): dentist lack of confidence in curing TMD-related acute pain (OR 5.60; 95% CI 1.260 to 24.861) and proportion of patients with severe TMD-related pain (OR 0.95; 95% CI 0.909 to 0.999).

### Discussion

The results of this study indicate that most of the participants used similar diagnostic protocols to diagnose TMD, including questionnaires and examinations. The most-used treatments were splints or mouthguards, medications, and self-care. Over half of the participants indicated that they would perform occlusal adjustment for TMD-related pain. There was a significant association between the decision to perform occlusal adjustment and lack of therapeutic confidence in curing TMD-related acute pain, and between the decision to perform occlusal adjustment and the proportion of patients with severe TMD-related pain.

Occlusal adjustment is irreversible and should only be used to “identify and eliminate gross occlusal discrepancies such as those that may inadvertently occur as a result of restorative procedures.”<sup>2</sup> However, 57.6% of JDPBRN dentists recommended occlusal adjustments to treat TMD-related pain, as did 64% of US DPBRN dentists.<sup>1</sup> Although it is unclear whether this treatment was recommended primarily to eliminate gross occlusal discrepancies as a result of restorative procedures or as an initial treatment for TMD-related pain, this finding

**Table 3** Most Frequent Treatment Provided by Dentists for Pain Related to TMD

	n (%)
Treatment types <sup>a</sup> (n = 85)	
Splint or mouthguard	82 (96.5)
Over-the-counter or prescribed medications	72 (84.7)
Self-care	59 (69.4)
Jaw exercises	50 (58.8)
Occlusal adjustment	49 (57.6)
Referral to physical therapist	4 (4.7)
Other	20 (23.5)

<sup>a</sup>Participants could select more than one treatment option.

may suggest that occlusal adjustment is provided to patients more frequently than necessary. The Japanese Society for the Temporomandibular Joint evidence-based clinical practice guidelines recommend against occlusal adjustment for primary treatment,<sup>4</sup> which suggests the possible existence of an evidence-practice gap between the clinical guideline and actual practice for the use of occlusal adjustment for TMD-related pain.

The results of the multiple logistic regression analysis demonstrated that dentists with lack of therapeutic confidence in their ability to cure patients of TMD-related acute pain within 6 months of onset preferred the use of occlusal adjustment as an intervention. Thus, dentists without confidence might be preoccupied with the idea that intervention is warranted and finally decide to use occlusal adjustment. In addition, the results of multiple regression analysis also showed that dentists treating many patients with severe TMD-related pain tended to avoid using occlusal adjustment. This result may suggest that dentists treating many patients with severe TMD-related pain do not perform occlusal adjustment according to their clinical practice guidelines.

**Table 4 Type of Self-care Instruction, Splints, and Medications Recommended by Dentists for Treating Pain Related to TMD**

	Usually/always, n (%)	Sometimes/half of time, n (%)	Never, n (%)
<b>Type of splint</b>			
Hard custom mouthguard (n = 85)	34 (40.0)	40 (47.1)	11 (12.9)
Soft custom mouthguard (n = 83)	16 (19.3)	35 (42.2)	32 (38.6)
Anterior repositioning splint (n = 79)	3 (3.8)	9 (11.4)	67 (84.8)
Soft over-the-counter mouthguard (n = 78)	1 (1.3)	1 (1.3)	76 (97.4)
Nociceptive trigeminal inhibition appliance (n = 75)	0 (0)	2 (2.7)	73 (97.3)
Other (n = 28)	2 (7.1)	1 (3.6)	25 (89.3)
<b>Type of medication</b>			
Over the counter			
Acetaminophen (n = 83)	1 (1.2)	6 (7.2)	76 (91.6)
Aspirin (n = 83)	0 (0)	3 (3.6)	80 (96.4)
Ibuprofen (n = 83)	0 (0)	4 (4.8)	79 (95.2)
Naproxen (n = 83)	0 (0)	1 (1.2)	82 (98.8)
Loxoprofen Sodium (n = 82)	0 (0)	6 (7.3)	76 (92.7)
Prescription			
Loxoprofen sodium (n = 87)	33 (37.9)	39 (44.8)	15 (17.2)
Diclofenac sodium (n = 82)	7 (8.5)	30 (36.6)	45 (54.9)
Ibuprofen (n = 83)	6 (7.2)	6 (7.2)	71 (85.5)
Muscle relaxants (n = 84)	4 (4.8)	8 (9.5)	72 (85.7)
Indomethacin (n = 83)	1 (1.2)	6 (7.2)	76 (91.6)
Amfenac sodium (n = 84)	1 (1.2)	5 (6.0)	78 (92.9)
Low-dose tricyclic antidepressants (n = 82)	0 (0)	2 (2.4)	80 (97.6)
Naproxen (n = 83)	0 (0)	4 (4.8)	79 (95.2)
Aspirin (n = 84)	0 (0)	9 (10.7)	75 (89.3)
Tramadol (n = 83)	0 (0)	0 (0)	83 (100)
Other opioids (n = 83)	0 (0)	0 (0)	83 (100)
<b>Type of self-care instruction</b>			
Avoid clenching or grinding teeth (n = 88)	66 (75.0)	20 (22.7)	2 (2.3)
Relax your jaw (muscles) (n = 88)	57 (64.8)	20 (22.7)	11 (12.5)
Identify pain triggers (n = 87)	52 (59.8)	27 (31.0)	8 (9.2)
Eat a pain-free diet (n = 88)	44 (50.0)	37 (42.0)	7 (8.0)
Get a good night's sleep (n = 88)	32 (36.4)	34 (38.6)	22 (25.0)
Eat a soft diet (n = 88)	31 (35.2)	46 (52.3)	11 (12.5)
Keep your teeth apart (n = 87)	29 (33.3)	25 (28.7)	33 (37.9)
Avoid biting objects (eg, pens) (n = 88)	29 (33.0)	36 (40.9)	23 (26.1)
Avoid chewing gum (n = 88)	26 (29.5)	40 (45.5)	22 (25.0)
Chew food on both sides of your back teeth at the same time (n = 87)	24 (27.6)	39 (44.8)	24 (27.6)
Apply heat (n = 87)	16 (18.4)	41 (47.1)	30 (34.5)
Avoid pushing your tongue against your teeth (n = 87)	15 (17.2)	29 (33.3)	43 (49.4)
Avoid biting on your fingernails (n = 88)	19 (21.6)	32 (36.4)	37 (42.0)
Avoid biting tongue/lip/cheek (n = 88)	14 (15.9)	38 (43.2)	36 (40.9)
Place tongue gently on your palate (n = 87)	7 (8.0)	28 (32.2)	52 (59.8)
Apply ice (n = 85)	3 (3.5)	34 (40.0)	48 (56.5)
Avoid caffeine (n = 88)	0 (0)	16 (18.2)	72 (81.8)

**Table 5 Factors Affecting Dentist Decision to Perform Occlusal Adjustment for Pain Related to TMD**

Variable	OR	95% CI		P value
		Lower	Upper	
Gender (reference: male)	2.45	0.560	10.691	.234
Years since graduation from dental school <sup>a</sup>	1.00	0.950	1.048	.939
Dentist confidence in curing TMD-related acute pain <sup>a</sup>				
Confident	1			
Neither agree nor disagree	0.76	0.239	2.437	.648
Not confident	5.60	1.260	24.861	.024
Proportion of patients with severe TMD-related pain <sup>a</sup>	0.95	0.909	0.999	.047
Number of TMD pain patients treated per month <sup>a</sup>	1.05	0.993	1.100	.092

Overall predictive accuracy is 66.7% in the logistic regression model. OR = odds ratio; 95% CI = confidence interval.

<sup>a</sup>Continuous variable.

On the basis of behavioral science theories, self-efficacy, which is the individual's confidence in determining how well he or she can take the actions necessary to produce certain results,<sup>17-19</sup> is a critical factor in the individual's ability to perform appropriate behavior.<sup>17-25</sup> In addition, one of the most important elements in enhancing self-efficacy is active mastery experience.<sup>19</sup> Therefore, the findings of this study may indicate that experienced dentists with previous success in the treatment of patients with severe TMD-related pain have the enhanced self-efficacy to avoid performing occlusal adjustment.

The most commonly recommended splint was a hard acrylic custom stabilization splint. This result is consistent with those of the US DPBRN study.<sup>1</sup> The Japanese clinical guideline for the initial treatment of TMD patients recommends the use of a maxillary stabilization splint (a thin and full occlusal coverage appliance made from hard acrylic resin).<sup>4</sup> This recommendation is consistent with the present study result.

In this study, prescription medications using loxoprofen sodium or diclofenac sodium were predominant, whereas OTC medication was rarely used. JDPBRN dentists frequently prescribed loxoprofen sodium (37.9%) and diclofenac sodium (8.5%). In contrast, the previous US DPBRN study results revealed that OTC medication was more prevalent than prescription medication in the US. The drug most frequently recommended by US DPBRN dentists was ibuprofen, in most cases purchased OTC (56%) and less frequently prescribed (16%). The OTC medication system in Japan differs from that in the US due to differences in health care systems; nevertheless, patients with TMD-related pain generally received nonsteroidal anti-inflammatory drugs as medication in both Japan and the US.

In the case of self-care, avoid clenching or grinding teeth was most commonly recommended (75.0%), followed by relax your jaw (muscles) (64.8%) and identify pain triggers (59.8%). Although in general the types of self-care instruction for TMD-related pain may differ in accordance with patient characteristics, dentists in this study used fewer components of self-care usually or always recommended for patients compared with US DPBRN dentists, except for the relax your jaw (muscles) (64.8%) component and the chew food on both sides of your back teeth at the same time (27.6%) component.<sup>1</sup>

Finally, 35% of dentists in the previous US DPBRN study used referral to physical therapists<sup>1</sup> versus only 4.7% in the present study. This disparity in collaboration with physical therapists might be due to differences in health care systems and interprofessional education, suggesting that active interprofessional cooperation between dentists and physical therapists is more prevalent in the US.

The main strength of this study was that use of the same questionnaire as that used in a previous study<sup>1</sup> allowed the results to be compared internationally. Several limitations of the study also warrant mention. First, since the results were based on dentists' self-reported answers, a degree of information bias may be present; data about patient characteristics derived from dentist memory might have been subject to recall bias. Second, participants were not selected randomly, but rather responded to a request for participation in the JDPBRN. In addition, in contrast to the previous US study,<sup>1</sup> which included several dental practice-based research networks and 862 dentists, the present study was based on responses from only 113 dentists. Nevertheless, the participants covered a reasonably wide diversity of dental care and came from all seven regions of Japan. Age and sex distributions in the study sample reflected the actual distribution of dentists in Japan (80% male, average age in the 40s),<sup>26</sup> supporting the generalizability of the findings.

## Conclusions

Most of the JDPBRN dentists used similar diagnostic protocols, including questionnaires and examinations, to diagnose TMD. The most commonly used treatments were splints or mouthguards, medications, and self-care. Over half of the participants indicated that they would perform occlusal adjustment for TMD-related pain. There was a significant association between the decision to perform occlusal adjustment and lack of therapeutic confidence in curing TMD-related acute pain, as well as between the decision to perform occlusal adjustment and the proportion of patients with severe TMD-related pain. An evidence-practice gap may exist between the clinical guideline and actual practice regarding occlusal adjustment for TMD-related pain. This gap may be ameliorated by conducting further studies about what harms or benefits result from occlusal adjustment, especially as the first choice in trying to address TMD problems associated with pain. Then treatment recommendations on this controversial topic can be based on sound clinical evidence to guide the clinician to provide the best evidence-based treatments for their patients.

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