Original Article

JOMP
Journal of Oral Medicine and Pain

pISSN 2288-9272 eISSN 2383-8493
J Oral Med Pain 2015;40(2):72-78
http://dx.doi.org/10.14476/jomp.2015.40.2.72

Self-checking Type, Repetitive, Education Efficacy for Temporomandibular Disorder Patients

Soo-Min Ok[1,2], Kyung-Hee Kim[3], Jun-Young Heo[2,4], Yong-Woo Ahn[1,2], Sung-Hee Jeong[1,2]

[1]Department of Oral Medicine, School of Dentistry, Pusan National University, Yangsan, Korea
[2]Dental Research Institute, Pusan National University Dental Hospital, Yangsan, Korea
[3]Department of Oral Medicine, Busan Paik Hospital, Inje University College of Medicine, Busan, Korea
[4]Department of Oral Medicine, Pusan National University Dental Hospital, Yangsan, Korea

Received April 1, 2015
Revised April 13, 2015
Accepted April 24, 2015

Correspondence to:
Sung-Hee Jeong
Department of Oral Medicine, School of Dentistry, Pusan National University, 49 Busandaehak-ro, Mulgeum-eup, Yangsan 626-870, Korea
Tel: +82-55-360-5242
Fax: +82-55-360-5238
E-mail: drcookie@pusan.ac.kr

This work was supported by Pusan National University Research Grant, 2013.

Purpose: The purpose of this research was twofold: to compare the short-term efficacy of once-off education versus repetitive education (RE) of patients suffering from temporomandibular disorders (TMDs) and to determine whether there was any correlation amongst patient demographics, recommendation adherence degree and pain levels.

Methods: A total of 848 patients with TMDs were enrolled. The control group consisted of patients who received a standard conservative treatment (STD) over at least 6 visits with education provided only during the first visit. The experimental group consisted of patients who received STD but had also been given RE (STD+RE). The RE was delivered through a standardized self-assessment questionnaire (SAQ) that was completed by the patient during each visit. Pain, which included maximum comfortable opening (MCO) of the mouth and limitation of mouth opening (LOM), was compared between the two groups. Behavior pattern and reported pain level changes in the group who used the SAQ were also analyzed.

Results: The LOM was significantly improved in all of the experimental group patients (especially in females under 30 years of age, $p<0.05$). The MCO was significantly higher in females ($p=0.029$). All of the patients displayed improvements in their habits following RE, which resulted in a strong correlation with pain reduction. Adhering to the recommendations regarding questions 14 and 15 of the SAQ appeared to have the greatest effect on pain reduction.

Conclusions: These results clearly demonstrate that RE is more effective than once-off education for TMD patients who are female or under 30 years of age.

Key Words: Behavior therapy; Cognitive therapy; Health education; Temporomandibular joint disorders

INTRODUCTION

Temporomandibular disorders (TMDs) refer to a heterogeneous collection of disorders with symptoms that include pain, clicking, grating in the jaw joint and/or problems with chewing or opening the jaw.[1)] The prevalence rate is higher in females and people under the age of 45 years.[2)] The female-to-male ratios of patients with TMDs range from 3:1 to 6:1.[3)] The primary symptom that precipitates treatment seeking is pain. TMDs can be costly both for the sufferer and the health care system as a whole. The pain can range from mild discomfort to debilitation, which causes daily activity disruption and markedly affects the sufferer's quality of life.

Traditional intervention approaches include interocclusal appliances, physical therapy, surgery, nocturnal alarms, and occlusal equilibration.[4)] Many of these approaches have been characterized as reversible and conservative and

generally involve self-care strategies and behavioral therapies.[5-7] Cognitive behavioral therapies (CBT) aim to decrease maladaptive and increase adaptive patient cognitions and behaviors. These treatments are effective for a variety of chronic pain problems.[8-13] However, CBTs are time consuming; a recent comprehensive review, which included randomized controlled trials regarding CBTs for chronic pain, showed that the median number of treatment hours needed was 16 hours.[14]

TMD is a chronic disease that shows a fluctuation in progress. Therefore, educating and improving a patient's ability to manage symptoms cannot be overemphasized. Due to the time requirements of CBT, this approach cannot be applied to every TMD patient. A more feasible alternative is self- checking type, repetitive, education (SCRE) for TMD patients. This type of education is aimed at reducing pain and improving oral habits with significant execution time savings, which could result in much higher cost effectiveness. The health professional can also easily gain insight into patient behavior patterns. To date, there has been very little or no research into whether there is any significant correlation between a patient's sex and/or age and the level of self-care recommendation adherence and any subsequent pain reduction.

The ultimate goal of this study was to provide an objective evaluation of the SCRE program to determine whether it will actually produce better outcomes for TMD patients whilst also benefitting the healthcare system with improved cost-effectiveness. Furthermore, the analysis of any correlation amongst patient demographics, the self-care recommendation adherence degree and pain levels will determine whether the SCRE program, in its current form, can be effectively applied to all TMD patients.

MATERIALS AND METHODS

1. Study Design and Population

We enrolled a TMD patient sample from a patient population that presented with TMJ disorders to Department of Oral Medicine, Pusan National University Dental Hospital (Yangan, Korea) between 2013 and 2014.

The control group consisted of 79 TMD patients (30 men and 49 women) who received standard conservative treatment (STD) that was initiated between September and October 2013 at the Department of Oral Medicine (a complete enumeration survey). Each patient in this group had at least 6 visits, with education provided only during the first visit. The education included an explanation about the disease and detailed recommendations for self-management. The STD included medication, physical therapy, and splints if needed. The experimental group consisted of 769 TMD patients (248 men and 521 women) who had STD that was initiated at the Department of Oral Medicine between February and June 2014, and these patients were also given RE (STD+RE). Each patient had at least 6 visits and also

Table 1. Self-assessment questionnaire/recommendations for temporomandibular disorder patients

Temporomandibular disorder patient recommendations
Q1. Consume a soft diet (e.g., avoid firm and chewy foods. Do not bite off apples or carrots, etc.).
Q2. Use a slower chewing motion and smaller bites.
Q3. Limit the consumption of food or beverages that contain caffeine or spices.
Q4. Limit your mouth opening to a pain free range.
Q5. Avoid parafunctional habits, such as daytime teeth clenching and grinding, pushing jaw forward, and pushing tongue against teeth/roof of mouth.
Q6. Limit mouth opening that is associated with yawning by supporting your chin with your hand or tilting your head forward.
Q7. Warm up painful or stiff areas with a 65°C (or thereabouts) moist hot pack (2-3 times per day for 10-15 minutes).
Q8. Avoid touching your face or resting your chin on your hand.
Q9. Start off sleeping on your back. Don't worry if you change position during your sleep.
Q10. Avoid parafunctional habits such as chewing gum, biting fingernails, pursing lips, smoking cigarettes, and biting pens/pencils.
Q11. Make your sleep area comfortable by picking appropriate pillows and bedding.
Q12. Avoid carrying heavy items on your shoulder.
Q13. Sit upright in a relaxed and posturally neutral position.
Q14. Stress increases pain. Try to relax and relieve stress or avoid stressful situations involving family, friends or your social life in general.
Q15. Use your jaw only within the pain free range when eating or talking.

Q, question.

Table 2. Study patients' baseline characteristics

Variable	Experimental (n=769)	Control (n=79)	p-value
Age (y)	36.87±17.49	35.56±16.55	0.525[a]
Age group			0.561[b]
<30 y	347 (45.1)	36 (45.6)	
≥30, <50 y	209 (27.2)	25 (31.6)	
≥50 y	213 (27.7)	18 (22.8)	
Sex			0.302[b]
Male	248 (32.2)	30 (38.0)	
Female	521 (67.8)	49 (62.0)	

Values are presented as mean±standard deviation or number (%).
[a]Independent t-test; [b]chi-square test.

received instruction regarding the recommendations for TMD patients on the first visit. More importantly, the RE consisted of the patient re-reading the recommendations every 2 weeks for a total of 6 times in order to complete a self-assessment questionnaire (SAQ; Table 1) for self-evaluation of adherence. TMDs were diagnosed according to the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD).[15] A total of 848 TMD patients were enrolled in this study. The patients who refused to fill in the SAQ and/or stopped treatment without notice were excluded. The baseline characteristics of the 2 groups are presented in Table 2.

This study was reviewed and approved by the Pusan National University Dental Hospital's institutional review board (PNUDH-2013-003).

2. Study Variables

1) Treatment outcome measurement

Pain numerical rating scale (NRS; 0-10), maximum comfortable opening (MCO; mm), noise NRS (0-10), and limitation of mouth opening (LOM) NRS (0-10) were measured on every visit in both groups.

2) TMD patient recommendations

The self-care recommendations for the TMD patients included keeping teeth slightly apart by relaxing jaw muscles, using moist hot packs on painful areas, consuming a soft diet, maintaining correct posture, reducing stress and limiting mouth opening to a pain free range. Because RE is most effective when it is less time consuming, the TMD patient recommendations were condensed into a single page to include only the most important points. The experimental group patients were assessed a TMD patient recommendation adherence degree and recorded scores of 0, 1, 2, and 3 (never, score of 0; sometimes, score of 1; usually, score of 2; always, score of 3) on the SAQ (Table 1) on every visit.

3) Statistical methods

The data were summarized using descriptive statistics, which included frequency and percentage for the categorical variables and mean and standard deviation for the continuous variables. The study participant clinical characteristic differences were compared across the subgroups with chi-square tests for the categorical variables and independent t-tests for the continuous variables.

The aim of the statistical analysis was to model the pain predictors, LOM, MCO, and questionnaire responses over time. All of the analyses employed generalized linear mixed models for repeated measures, with the predictor variables set as treatment and time. The fixed effects in all of the models were time and treatment assignment, while the study participants were treated as random effects. Dummy variables were created for the treatment assignment and time, and an unstructured covariance matrix structure was utilized. The models were created with an interaction term (fixed effects) included, and if the interactions were not significant, then interaction terms were removed and the model was re-run, excluding the interaction term. Mean±standard error of measurement plots were also presented. p-values less than 0.05 were considered statistically significant. By its nature, this study was explorative, and no adjustments for multiple testing were therefore applied. All of the statistical analyses were carried out using the PASW Statistics version 18.0 for Windows (IBM Co., Armonk, NY, USA) and MedCalc 11.6 statistical software (MedCalc Ltd., Mariakerke, Belgium). All of the tests were of the two-tailed type.

RESULTS

1. Comparison between the Experimental and Control Groups

LOM was significantly improved in all of the experimental group patients, especially in female patients and patients under 30 years of age (Table 3). The experimental group

females showed a significant improvement in MCO (p=0.029) and the under 30 years of age group also tended to show an improvement (p=0.056; Table 4).

2. Comparative Analysis of the Improvements in the Experimental Group

1) Pain

Pain was reduced the most on the second visit. In comparison between the male and female groups, female patients maintained the pain reduction effect longer than males (Table 5).

2) LOM

LOM was generally improved, but only the female patients maintained improvement until the 5th visit, while the other subgroups only maintained improvement until the 2nd visit (data not shown).

3) Questionnaire scores

The total questionnaire (Table 1) scores gradually improved in all of the groups. However, the improvement was not sustained until the 6th visit in the subgroup of patients 30 to 50 years of age (Table 6).

Table 3. Treatment as predictors of LOM NRS (n=848)

	Predictor	Treatment	
		Experimental	Control
All participants model (n=848)	β	−0.426	Ref.
	SE	0.215	Ref.
	p-value	0.048	Ref.
Men only model (n=278)	β	−0.131	Ref.
	SE	0.416	Ref.
	p-value	0.753	Ref.
Women only model (n=570)	β	−0.567	Ref.
	SE	0.252	Ref.
	p-value	0.024	Ref.
<30 y (n=383)	β	−0.867	Ref.
	SE	0.335	Ref.
	p-value	0.010	Ref.
≥30, <50 (n=234)	β	0.213	Ref.
	SE	0.404	Ref.
	p-value	0.599	Ref.
>50 y (n=231)	β	−0.104	Ref.
	SE	0.421	Ref.
	p-value	0.805	Ref.

LOM NRS, limitation of mouth opening numerical rating scale (0-10); SE, standard error; Ref., reference.
p-values were derived from generalized linear mixed model.

Table 4. Treatment as predictors of MCO (n=848)

	Predictor	Treatment	
		Experimental	Control
All participants model (n=848)	β	1.897	Ref.
	SE	1.117	Ref.
	p-value	0.090	Ref.
Men only model (n=278)	β	−1.487	Ref.
	SE	1.432	Ref.
	p-value	0.300	Ref.
Women only model (n=570)	β	2.907	Ref.
	SE	1.328	Ref.
	p-value	0.029	Ref.
<30 y (n=383)	β	3.233	Ref.
	SE	1.689	Ref.
	p-value	0.056	Ref.
≥30, <50 y (n=234)	β	−1.308	Ref.
	SE	1.367	Ref.
	p-value	0.339	Ref.
>50 y (n=231)	β	−0.089	Ref.
	SE	1.365	Ref.
	p-value	0.948	Ref.

MCO, maximum comfortable opening (mm); SE, standard error; Ref., reference.
p-values were derived from generalized linear mixed model.

Table 5. Time as predictors of pain NRS

	Predictor	Time, p<0.001 (df=5)					
		1	2	3	4	5	6
All participants model (n=769)	β	Ref.	−1.4978	−1.8117	−1.7069	−1.5984	−1.4069
	SE	Ref.	0.1482	0.1979	0.2674	0.4040	0.6983
	p-value	Ref.	<0.001	<0.001	<0.001	<0.001	0.044
Men only model (n=248)	β	Ref.	−1.4219	−1.7507	−1.4923	−0.6173	−1.4173
	SE	Ref.	0.2733	0.3751	0.5529	1.0744	2.3833
	p-value	Ref.	<0.001	<0.001	0.007	0.566	0.552
Women only model (n=521)	β	Ref.	−1.5336	−1.8421	−1.7821	−1.7750	−1.4340
	SE	Ref.	0.1771	0.2339	0.3074	0.4398	0.7357
	p-value	Ref.	<0.001	<0.001	<0.001	<0.001	0.052

NRS, numerical rating scale; df, degree of freedom; SE, standard error; Ref., reference.

Table 6. Time interaction as predictors of total questionnaire scores

	Predictor	Time, p<0.001 (df=5)					
		1	2	3	4	5	6
All participants model (n=769)	β	Ref.	10.4512	13.2756	13.0027	13.2582	18.2305
	SE	Ref.	0.4921	0.6555	0.8878	1.3588	2.3182
	p-value	Ref.	<0.001	<0.001	<0.001	<0.001	<0.001
Men only model (n=248)	β	Ref.	11.3865	13.6041	10.9457	9.3457	17.1457
	SE	Ref.	0.9215	1.2600	1.8570	3.6082	8.0038
	p-value	Ref.	<0.001	<0.001	<0.001	0.010	0.033
Women only model (n=521)	β	Ref.	9.9505	12.9811	13.3081	13.4205	17.7548
	SE	Ref.	0.5785	0.7626	1.0052	1.4598	2.4058
	p-value	Ref.	<0.001	<0.001	<0.001	<0.001	<0.001
<30 y (n=347)	β	Ref.	9.5925	12.5382	12.8317	14.4230	19.1522
	SE	Ref.	0.6925	0.9421	1.2561	1.9016	3.0622
	p-value	Ref.	<0.001	<0.001	<0.001	<0.001	<0.001
≥30, <50 y (n=209)	β	Ref.	11.1032	12.8688	13.4842	13.0419	10.2919
	SE	Ref.	0.9109	1.1838	1.5885	2.2675	7.6570
	p-value	Ref.	<0.001	<0.001	<0.001	<0.001	0.180
≥50 y (n=213)	β	Ref.	10.9224	14.3671	12.6616	11.5716	18.4216
	SE	Ref.	0.9810	1.2964	1.8121	3.0868	3.8780
	p-value	Ref.	<0.001	<0.001	<0.001	<0.001	<0.001

df, degree of freedom; SE, standard error; Ref., reference.

The adherence rate of each recommendation was significantly higher than that of the first visit in all of the groups. The adherence degree for questions 1 to 6, 8 to 13 and 15 improved the most among female patients, followed by patients under 30 years of age and patients above 50 years of age. With regards to the use of hot packs (question 7), the following three groups exhibited the highest compliance levels in decreasing order; patients above 50 years of age, male patients and patients under 30 years of age. The female patients showed the greatest effort to relieve stress as per the recommendation in question 14. Moreover, unlike the other questions, the adherence degree actually dropped for patients under 30 years of age, and male patients showed the lowest adherence degree for question 14 (data not shown).

Generally, all of the groups attempted to follow the recommendations, but their compliance and symptom improvement declined over time. The only two groups that maintained their compliance and symptom improvement levels at a relatively consistent level were the female patients and the patients under 30 years of age.

The pain and total questionnaire scores (Fig. 1) showed a strong correlation. In particular, high scores for questions 14 and 15 (in descending order) showed a strong correlation with pain reduction (question 14, avoiding stress, Pearson's r=−0.210, p<0.001; question 15, using jaw within the pain free range, Pearson's r=−0.228, p<0.001).

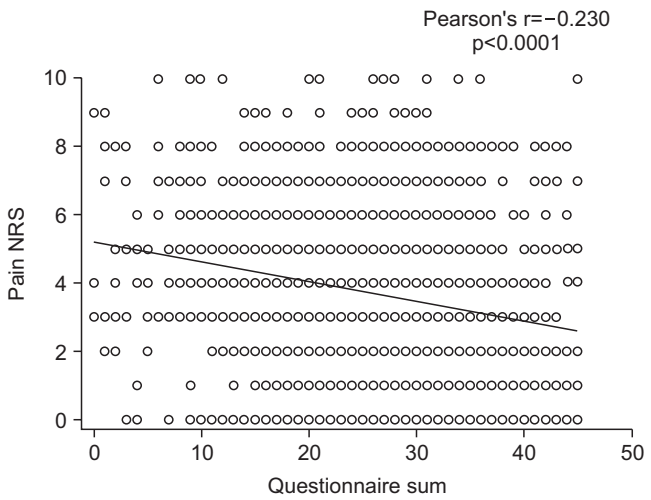

Fig. 1. Scatter plot between questionnaire score and pain numerical rating scale (NRS, 0-10) by Pearson's correlation analysis.

At the first visit, the scores for questions 2, 7 and 9 were less than 1, which indicated a low adherence degree. At the 6th visit, the scores for questions 2, 7, 3, 9, and 14 were 2.4 or less, which indicated a lower adherence degree in comparison to the other questions.

DISCUSSION

Research strongly suggests that psychological (stress-induced muscle hyper-reactivity) and behavioral factors (oral habits) play a critical role in the etiology of TMD.[7,16-20] The prevailing model[21-22] proposes that stressful events trigger maladaptive oral habits (e.g., teeth clenching as well as lip and fingernail biting) in individuals with TMD symptoms. The persistence of these oral habits increases tension in the mastication muscles and results in pain. Reducing the patient's stress level is difficult, but repeated prompting for recognition of the habits that may be triggered by stress may alter behavior and prevent or reduce pain in these patients.

TMD is a chronic disease that shows a fluctuation in progress. Because of this nature, it is important for TMD patients to understand the characteristics of the disease and to be educated about behavioral guidelines for when pain exists, as these actions may prevent the disease from becoming a chronic condition. Therefore, educating and improving a patient's ability to manage symptoms cannot be overemphasized.

SCRE can help TMD patients improve their understanding of the disease and give patients a chance to repeatedly learn the self-care recommendations through self-reflection and self-assessment of their own behavior. In particular, this approach gives patients an opportunity to identify and break bad habits. Additionally, the health professional can easily gain insight into patient behavior patterns.

In the reality of modern day Korea, it is difficult to administer CBT to patients due to high costs, in terms of time and resources, despite its effectiveness. Thus, it is not feasible for CBT to be routinely offered to every TMD patient. In contrast, SCRE, which is administered in the form of self-evaluating questionnaires, takes only a few minutes to perform and does not require an inspector. This represents a significant time-saving and cost-effective strategy in comparison to the existing methods. Furthermore, SCRE can improve treatment efficacy with minimal time and resource investments. Although many studies have shown the high efficiency of CBT and its importance in myofascial pain (MFP) patients, it is also important to follow the recommendations for non-MFP patients.

The primary aim of this study was to determine whether SCRE showed any real advantage over the usual method of once-off patient education during the first visit of the treatment regimen for TMD patients in terms of pain management. We also analyzed which recommendations resulted in the greatest pain reduction, and hence, which recommendations should be strongly emphasized to each patient.

The results of this study suggest that a habit reversal treatment strategy may be an effective intervention for many patients suffering from TMD. This treatment approach showed the most powerful effect on dependent measures that were related to LOM and MCO for female patients and patients under 30 years of age. The same two subgroups also displayed a substantial improvement in patient habits through RE, which resulted in a strong correlation with pain reduction. However, this trend declined over time (number of visits) for patients over 30 years of age and male patients. Therefore, a more effective strategy or method is needed to increase recommendation adherence for TMD patients who are male or over 30 years of age.

Our results also show that adhering to the recommendations in questions 1, 2, 5, 9 and especially questions 14 and 15 produced significant pain reduction; therefore, these topics should be the main points of emphasis for these patients. Because pain affects quality of life, patients should attempt to comply with the specific recommendations that reduce pain. However, the recommendations in questions 7, 2, and 9 were not followed well (scores of less than 1 at the 1st visit); therefore, these items need to be emphasized more rigorously during patient education. Similarly, questions 2, 7, 3, 9, and 14 also yielded low scores (2.4 or less), which indicated lower degrees of adherence compared with the other recommendations at the 6th visit. Thus, these topics should also be emphasized during patient education.

Because a significant amount of correlation was observed between pain improvement and the recommendation adherence rate for TMD patients, it would be reasonable to conclude that SCRE is effective in pain management. This effect was clearly predominant in female patients and those under 30 years of age, which is also the population that is most affected by TMDs. Therefore, it would be reasonable to conclude that SCRE was effective when applied to TMD treatment. In future studies, it be interesting to further investigate specific patient groups according to their diagnosis.

The experimental and control group subjects did not

differ significantly regarding a number of variables, including demographics; however, there were differences in the TMD subgroup distribution. The percentage of non-masticatory muscle disorder patients in the experimental group was much higher than that in the control group, which may have skewed the results to appear lower. However, because a complete enumeration survey of the visited patients was conducted, this variable could not be controlled for. Additionally, all of the subjects included were TMD patients, although more specific matching of patients according to their diagnosis or treatment needs to be considered for future cases. In future studies, more meaningful pain data may also be obtained through the analysis of pain diaries kept by patients to record their pain level in everyday life (using a NRS). Additionally, future studies should consider environmental factors, such as the seasons in Korea, when planning these types of experiments.

In spite of the limitations described above, the results of this study suggest that SCRE improved MCO and LOM more than the existing method. Thus, SCRE may be used to improve treatment efficacy with minimum effort, although future studies regarding long-term efficacy are needed.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Luther F, Layton S, McDonald F. Orthodontics for treating temporomandibular joint (TMJ) disorders. Cochrane Database Syst Rev 2010;(7):CD006541.
2. Glaros AG, Glass EG. Temporomandibular disorders. In: Gatchel RJ, Blanchard EB, eds. Psychophysiological disorders: research and clinical applications. Washington, DC: American Psychological Association; 1993. pp. 299-356.
3. McNeill C. History and evolution of TMD concepts. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1997;83:51-60.
4. List T, Axelsson S. Management of TMD: evidence from systematic reviews and meta-analyses. J Oral Rehabil 2010;37:430-451.
5. Feine JS, Widmer CG, Lund JP. Physical therapy: a critique. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1997;83:123-127.
6. Conti PC, de Alencar EN, da Mota Corrêa AS, Lauris JR, Porporatti AL, Costa YM. Behavioural changes and occlusal splints are effective in the management of masticatory myofascial pain: a short-term evaluation. J Oral Rehabil 2012;39:754-760.
7. Komiyama O, Kawara M, Arai M, Asano T, Kobayashi K. Posture correction as part of behavioural therapy in treatment of myofascial pain with limited opening. J Oral Rehabil 1999;26:428-435.
8. Liu HX, Liang QJ, Xiao P, Jiao HX, Gao Y, Ahmetjiang A. The effectiveness of cognitive-behavioural therapy for temporomandibular disorders: a systematic review. J Oral Rehabil 2012;39:55-62.
9. Dworkin SF, Turner JA, Wilson L, et al. Brief group cognitive-behavioral intervention for temporomandibular disorders. Pain 1994;59:175-187.
10. Dworkin SF. The case for incorporating biobehavioral treatment into TMD management. J Am Dent Assoc 1996;127:1607-1610.
11. Turner JA, Holtzman S, Mancl L. Mediators, moderators, and predictors of therapeutic change in cognitive-behavioral therapy for chronic pain. Pain 2007;127:276-286.
12. Morishige E, Ishigaki S, Yatani H, Hirokawa M. Clinical effectiveness of cognitive behavior therapy in the management of TMD. Int J Prosthodont 2006;19:31-33.
13. Turner JA, Mancl L, Aaron LA. Brief cognitive-behavioral therapy for temporomandibular disorder pain: effects on daily electronic outcome and process measures. Pain 2005;117:377-387.
14. Morley S, Eccleston C, Williams A. Systematic review and meta-analysis of randomized controlled trials of cognitive behaviour therapy and behaviour therapy for chronic pain in adults, excluding headache. Pain 1999;80:1-13.
15. Dworkin SF, LeResche L. Research diagnostic criteria for temporomandibular disorders: review, criteria, examinations and specifications, critique. J Craniomandib Disord 1992;6:301-355.
16. Moss RA, Villarosa GA, Cooley JE, Lombardo TW. Masticatory muscle activity as a function of parafunctional, active and passive oral behavioural patterns. J Oral Rehabil 1987;14:361-370.
17. Vedolin GM, Lobato VV, Conti PC, Lauris JR. The impact of stress and anxiety on the pressure pain threshold of myofascial pain patients. J Oral Rehabil 2009;36:313-321.
18. Schmitter M, Kress B, Ohlmann B, Henningsen P, Rammelsberg P. Psychosocial behaviour and health care utilization in patients suffering from temporomandibular disorders diagnosed on the basis of clinical findings and MRI examination. Eur J Pain 2005;9:243-250.
19. Winocur E, Gavish A, Finkelshtein T, Halachmi M, Gazit E. Oral habits among adolescent girls and their association with symptoms of temporomandibular disorders. J Oral Rehabil 2001;28:624-629.
20. Pullinger AG, Monteiro AA. History factors associated with symptoms of temporomandibular disorders. J Oral Rehabil 1988;15:117-124.
21. Laskin DM. Etiology of the pain-dysfunction syndrome. J Am Dent Assoc 1969;79:147-153.
22. Haber JD, Thompson JK, Raczynski JM, Sikora TL. Physiological self-control and the biofeedback treatment of headache. Headache 1983;23:174-178.