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Comparison of Clinical and Psychological Characteristics between Self-Reported Bruxism and Clinically Detected Bruxism by Wear Facet on Splint

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Purpose: Bruxism is commonly considered a major risk factor for temporomandibular disorders (TMD), and the psychosocial factors had been one of the etiologic factor of bruxism. But there are still unsolved issues on the relationship between sleep bruxism and TMD and the etiologic factors of bruxism. This study is aim to evaluate the clinical and psychosocial characteristics according to diagnostic grade of bruxism in TMD patients.

Methods: Three hundred subjects were enrolled who were under the stabilization splint therapy for TMD. Recently international consensus proposed a diagnostic grading system of "possible", "probable", and "definite" sleep or awake bruxism for clinical and research purpose. According to their suggestion, we classified these subjects as self-reported bruxism (SRB) and wear facet bruxism (WFB). We investigated the clinical characteristics (sex, age, chief complaint, pain duration, visual analogue scale), sum of tenderness (temporomandibular joint, masticatory muscles, cervical muscles), diagnosis of TMD according to research diagnostic criteria (the Research Diagnostic Criteria for Temporomandibular Disorders, RDC/TMD), headache, subjective sleep quality (Pittsburgh Sleep Quality Index, PSQI), and psychosocial characteristics (Symptom Checklist-90-Revised, SCL-90-R) in enrolled subjects. We compared the clinical and psychosocial characteristics between these bruxism groups.

Results: There were no significant correlation between self-reported and WFB (p=0.13). SRB subjects more reported pain as a chief complain than subject who did not report bruxism (p=0.014). The mean score of global PSQI was significantly higher in SRB than in did not report positively subjects (p=0.045). The mean score of anxiety and phobic anxiety was significantly higher in SRB than in did not reported positively subjects (p=0.045, p=0.041).

Conclusions: Although bruxism is regarded as risk factor of TMD, this study showed inconsistent result between SRB and clinically detected bruxism by wear facet on slpint. We suggest that the clinician should consider with extreme caution when they assess SRB.

Key Words: Bruxism; Splints; Temporomandibular joint disorders

INTRODUCTION

Bruxism is defined as a repetitive jaw-muscle activity characterized by clenching or grinding of the teeth and/or by bracing or thrusting of the mandible,[1)] and is commonly considered one of major risk factor for temporomandibular disorders (TMD).

Many studies reported that self-reported/questionnaire-diagnosed bruxism had positive association with myofascial pain, temporomandibular joint (TMJ) pain and condylar bony changes.[2-8)] Whereas some other studies reported that there was not any correlation between bruxism and TMD

symptoms and signs,[2,9] and another reported unclear results as for unequivocal support/rejection of the correlation between bruxism and TMD.[2,10,11] One of the reasons of uncertainty of correlation between bruxism and TMD is lack of definitively reliable methods for assessing bruxism.[12] It is difficult to assess bruxism and the various methods for diagnosing bruxism are lack of validity.

Recently, international consensus proposed diagnostic grading system of "possible", "probable", and "definite" sleep or awake bruxism. "Possible" sleep or awake bruxism should be based on self-report. "Probable" sleep or awake bruxism should be based on self-report plus the inspection part of a clinical examination. "Definite" sleep bruxism should be based on self-report, a clinical examination, and a polysomnographic recording, preferably along with audio/video recordings.[1]

After international consensus statement, it still has been not definitively clarified that correlation between bruxism and TMD according to bruxism classification. Therefore we used this diagnostic grading system for study and evaluated the clinical and psychosocial characteristics according to diagnostic grade of bruxism in TMD patients.

MATERIALS AND METHODS

The patients who were under the stabilization splint therapy for TMD in Wonkwang University Dental Hospital from 2009 to 2013 year were enrolled. This study was approved by the Institutional Review Board of the Wonkwang University Dental Hospital (IRB No. WKDIRB201504-02).

The patients who have systemic disease or taking medicine which may affect bruxism, psychologic characteristics and sleep quality were excluded. Total 300 subjects were included. All subjects underwent a thorough assessment in accordance with the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD).

We classified subjects into two groups; self-reported bruxism (SRB) group and wear facet bruxism (WFB) group—the inspection of a clinical examination by wear facet on stabilization splint. We investigated the clinical characteristics (sex, age, chief complaint, pain duration, pain intensity [visual analogue scale, VAS], sum of tenderness (TMJ, masticatory muscles, cervical muscles), diagnosis of TMD according to RDC/TMD, subjective sleep quality (Pittsburgh Sleep Quality Index, PSQI) and psychosocial characteristics (Symptom Checklist-90-Revised, SCL-90-R) in enrolled subjects.

The PSQI[13] is an effective instrument to measure the quality and patterns of sleep and is a self-reported questionnaire which evaluates sleep quality during the previous one month. It consists of 19 items, and seven domains: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction over the last month. The client rates each of these seven areas of sleep. Scoring of the answers is based on a 0 to 3 scale, whereby 3 reflect the negative extreme on the Likert scale. A global sum of "5" or greater indicates a "poor" sleeper.

We used SCL-90-R[14] which is one of the most widely used measures for evaluation of psychological distress in clinical practice and research for evaluation of psychosocial factors. It consists of 90 items and yield nine scores along primary symptom dimensions and three scores among global distress indices. Primary symptom dimensions are consist of including somatization (SOM), obsessive-compulsive behavior (OC), interpersonal sensitivity (IS), depression (DEP), anxiety (ANX), hostility (HOS), phobic anxiety (PHOB), paranoid ideation (PAR), and psychoticism (PSY). The three indices are global wellness index, hardiness, and symptom free.

We compared the clinical and psychosocial characteristics between these bruxism groups. Data were analyzed using Pearson χ^2 and two way ANOVA for correlation of each item between both groups. We used IBM SPSS Statistics 22 (IBM Co., Armonk, NY, USA).

RESULTS

The total 300 subjects were consisted of 98 male (32.7%; mean age, 25.8 years; range, 11-83 years) and 202 female (67.3%; mean age, 26.7 years; range, 10-73 years). The percentage of subjects of SRB group were 42.8% (self-reported tooth grinding, 12.4%; clenching, 23.4%; both, 7%), and that of WFB group was 23%.

The percentage of accuracy, which means true-positive plus true-negative between SRB and WFB groups was

57.5%. The percentage of false-positive reports by the subjects which means that SRB that was not confirmed by wear facet was 31.1%, and that of false-negative reports, which means that positive wear facet that was not reported by the patients was 11.4%. But there was no significant correlation between SRB and WFB (Table 1).

There was no significant association between SRB and WFB groups in biographical information of subjects, except age in WFB group. The older the subjects are, the lower the number of WFB group subjects are ($p<0.001$; Table 2).

The percentage of subjects who reported pain as a chief complain in SRB group was 77.2%, and that of subjects who did not report bruxism was 66.7%. There was significant correlation between SRB and did not reported positively subjects ($p<0.05$; Table 3).

There was significant difference in pain intensity (VAS) between SRB and WFB groups ($p=0.027$). In the other clinical aspects, i.e., sum of TMJ, masticatory muscle and cervical muscle tenderness, and pain duration, there were no significant differences between the groups (Table 4).

Majority of all subjects (72.8%) reported poor sleep quality. The mean score of global PSQI was significantly higher in SRB (7.90±0.28) than subjects who did not report bruxism (7.12±0.27) ($p<0.05$). But, there were no significant differences between SRB and WFB groups in all PSQI questionnaire sub domain; subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction over the last month (Table 5).

The mean score of anxiety and phobic anxiety was

Table 1. Percentage accuracy between two approach, and false-positive and false-negative self-reported finding

Variable	Wear facet			χ^2	p-value
	Accuracy	False-positive	False-negative		
Self-reported	172 (57.5)	93 (31.1)	34 (11.4)	2.295	0.13

Values are presented as number (%).
Statistical significant at significant level of $p<0.05$.
Statistical analysis was 299 subjects because of missing value.

Table 2. Age distribution

Age (y)	SRB group		χ^2	p-value	WFB group		χ^2	p-value
	Yes (n=128)	No (n=171)			Yes (n=69)	No (n=230)		
≥19	41.8	58.2			32.6	67.4		
20-39	46.1	53.9	1.034	0.596	19.1	80.9	16.146	<0.000
≤40	38.0	62.0			6.0	94.0		

SRB, self-reported bruxism; WFB, wear facet bruxism.
Values are presented as %.
Statistical significant at significant level of $p<0.05$.
Statistical analysis was 299 subjects because of missing value.

Table 3. Correlation between chief complaint and two bruxism groups

Variable	SRB group		χ^2	p-value	WFB group		χ^2	p-value
	Yes (n=128)	No (n=171)			Yes (n=69)	No (n=230)		
TMJ sound	11.4	11.9			14.9	10.7		
Pain	77.2	66.7			73.1	70.7		
MO	8.1	17.3	12.553	0.014	7.5	15.1	3.312	0.507
Others	0.8	4.2			3.0	2.7		
Bruxism	2.4	0.0			1.5	0.9		

SRB, self-reported bruxism; WFB, wear facet bruxism; TMJ, temporomandibular joint; MO, mouth opening.
Values are presented as %.
Statistical significant at significant level of $p<0.05$.
Statistical analysis was 299 subjects because of missing value.

Table 4. Comparison of clinical characteristics

Variable	SRB group			WFB group			F	p-value
	Yes (n=128)	No (n=171)	p-value	Yes (n=69)	No (n=230)	p-value		
TMJtend	3.83±0.44	3.93±0.42	0.875	3.66±0.53	4.11±0.30	0.456	0.158	0.691
MMtend	4.16±0.42	3.34±0.40	0.158	3.85±0.51	3.65±0.28	0.725	0.374	0.542
CMtend	4.24±0.44	3.89±0.42	0.566	4.33±0.53	3.80±0.30	0.390	0.358	0.550
Sumtend	12.24±1.08	11.16±1.04	0.472	11.83±1.31	11.56±0.73	0.855	0.024	0.877
Pain duration	478.56±84.36	584.32±81.37	0.368	573.52±102.09	489.36±57.58	0.473	3.383	0.067
Open	43.36±0.86	43.28±0.83	0.947	44.07±1.04	42.57±0.58	0.208	0.036	0.850
Pain intensity (VAS)	4.55±0.20	4.69±0.20	0.629	4.45±0.25	4.74±0.14	0.390	4.926	0.027

SRB, self-reported bruxism; WFB, wear facet bruxism; TMJtend, number of temporomandibular joint (lateral, posterior) tenderness site; MMtend, number of masticatory muscles (masseter anterior, deep masseter, maseeter inferior, temporal anterior, temporal middle, temporal posterior) tenderness site; CMtend, number of cervical muscles (trapezius insertion, trapezius upper, sternocleidomastoid origin, sternocleidomastoid middle, sternocleidomastoid insertion) tenderness site; Sumtend, sum of number tenderness site; Pain duration, onset (days); Open, maximum opening (mm); VAS, visual analogue scale.
Values are presented as mean±standard deviation.
Statistical significant at significant level of $p<0.05$.
Statistical analysis was 299 subjects because of missing value.

Table 5. Comparison of quality of sleep

Variable	SRB group			WFB group			F	p-value
	Yes (n=128)	No (n=171)	p-value	Yes (n=69)	No (n=230)	p-value		
Sleep duration	0.80±0.09	0.68±0.09	0.376	0.65±0.11	0.83±0.06	0.175	3.463	0.064
Sleep disturbance	1.05±0.06	1.02±0.06	0.711	1.04±0.08	1.03±0.04	0.832	0.002	0.963
Sleep latency	1.06±0.90	1.03±0.09	0.813	1.03±0.11	1.05±0.06	0.862	1.356	0.245
Daytime dysfunction	1.72±0.80	1.55±0.08	0.134	1.67±0.10	1.61±0.05	0.610	0.014	0.907
Sleep efficiency	1.79±0.14	1.61±0.14	0.389	1.62±0.17	1.78±0.10	0.426	0.134	0.714
Sleep quality	1.37±0.08	1.17±0.18	0.068	1.32±0.10	1.23±0.05	0.426	0.517	0.473
Medication	0.12±0.04	0.07±0.04	0.438	0.10±0.05	0.09±0.03	0.815	0.093	0.760
Global PSQI	7.90±0.28	7.12±0.27	0.045	7.41±0.34	7.60±0.19	0.627	0.325	0.569

SRB, self-reported bruxism; WFB, wear facet bruxism; PSQI, Pittsburgh Sleep Quality Index.
Values are presented as mean±standard deviation.
Statistical significant at significant level of $p<0.05$.
Statistical analysis was 299 subjects because of missing value.

Table 6. Comparison of score of SCL-90-R

Variable	SRB group			WFB group			F	p-value
	Yes (n=128)	No (n=171)	p-value	Yes (n=69)	No (n=230)	p-value		
Somatization	50.05±1.37	46.47±1.20	0.050	48.90±1.56	47.61±0.96	0.478	0.057	0.812
Obsessive-compulsive behavior	44.80±1.38	42.92±1.21	0.308	43.81±1.57	43.91±0.94	0.957	0.137	0.711
Interpersonal sensitivity	44.35±1.17	42.19±1.03	0.168	43.45±1.34	43.09±0.80	0.821	0.040	0.842
Depression	44.27±1.26	42.24±1.10	0.226	43.24±1.43	43.27±0.86	0.987	0.000	0.987
Anxiety	45.62±1.19	42.42±1.04	0.045	44.37±1.36	43.66±0.81	0.654	0.178	0.674
Hostility	45.85±1.10	44.67±0.96	0.417	45.32±1.25	45.20±0.75	0.935	0.142	0.706
Phobic anxiety	47.23±1.13	44.14±0.99	0.041	46.07±1.29	45.30±0.77	0.608	0.071	0.790
Paranoid ideation	42.24±1.03	42.58±0.90	0.805	42.53±1.17	42.28±1.23	0.853	0.645	0.423
Psychoticism	44.15±1.08	43.53±0.94	0.664	44.23±1.23	43.45±0.74	0.585	1.594	0.208
GSI	45.01±1.29	42.50±1.13	0.143	43.89±1.47	43.61±0.88	0.870	0.030	0.862
PSDI	50.83±1.30	49.83±1.14	0.562	50.33±1.48	50.34±0.90	0.999	2.553	0.112
PST	41.80±1.37	38.36±1.20	0.061	40.67±1.56	39.49±0.94	0.518	0.595	0.442

SRB, self-reported bruxism; WFB, wear facet bruxism; SCL-90-R, Symptom Checklist-90-Revised; GSI, Global Severity Index; PSDI, Positive Symptom Distress Index; PST, Positive Symptom Total.
Values are presented as mean±standard deviation.
Statistical significant at significant level of $p<0.05$.
Statistical analysis was 299 subjects because of missing value.

significantly higher in SRB subjects (ANX, 45.62±1.19; PHOB, 47.23±1.13) than in did reported "no" bruxism subjects in SRB group (ANX, 42.42±1.04; PHOB, 44.14±0.99; p=0.045). There were no significant differences between SRB and WFB groups in all SCL-90-R items (Table 6).

DISCUSSION

Bruxism is generally recognized as non-functional jaw movement and may be considered an important factor of initiation and perpetuation of TMD pain. But in this study, it did not show association between bruxism and TMD. Similar to this study, some studies reported that were no association between bruxism and pain in TMD patients.[15,16] And others suggested that the effects of bruxism have been overstated as a cause for TMD.[17]

Although many investigators have studied the association of bruxism and TMD, the results are inconclusive. Because the most of data came from studies adopting a SRB detection approach such as questionnaire and interviews to gather more suitable for widespreading data.[18] Studies based on self-report may have some potential bias and limitations. First, patients may often be unable to distinguish between sleep and awake bruxism. Second, SRB may be influenced by patient's beliefs about bruxism as the cause of pain and by the opinions expressed by the dentist. Third, SRB has an unclear reliability to the actual bruxism activity such as information about the intensity and frequency of bruxism behaviours.[19] Paesani et al.[20] suggested that a strong positive correlation between the two approaches can be achieved as for diagnosing awake clenching, while lower levels of agreement were detected for sleep-time activities in comparison study between SRB and clinical based diagnosis. Recently, Raphael et al.[18] were clearly concluded using polysomnography (PSG) that self-report of sleep bruxism (SB) is not a useful proxy for PSG-based evidence of SB and self-reported SB cannot be recommended even as a screening method for the assessment of clinically significant SB. They showed that self-report of tooth grinding awareness is highly unlikely to be a valid indicator of true SB. Similarly this study showed that inconsistent result between prevalence of SRB and clinically detected bruxism by wear facet on stabilization occlusal splint.

But, this study did not distinguish between SB and awake bruxism. It is known to have etiopathogenic difference between SB and awake bruxism. SB is characterized a grinding-type or grinding and clenching mixed activity and is associated with micro-arousal phenomena during sleep, whereas awake bruxism is characterized by a clenching-type activity and is believed to have association with psychosocial factors.[2] Activities of different bruxism are likely to have different consequences on the masticatory muscles and the TMJ. But it little is known about the different role of the different bruxism activities on the masticatory structures and etiology of TMD.[2,21]

We found that SRB subjects were showed poorer sleep quality than subjects who did not report bruxism. Although occurrence of SB is associated with micro-arousal, occurrence of SB does not disturb sleep structures.[22] We assumed that this result may be related to increase anxiety and phobic anxiety in SRB subjects in this study. There were similar reports that SRB may be indicator of sleep problem, especially frequent awakening,[23] and may be related psychological states such as anxiety or stress.[24]

However, there was no significant difference of clinical and psychological characteristics between "yes" and "no" subgroups in WFB groups. It remains unclear why self-perceived bruxism and polysomnographically or clinically detected bruxism seem to be poorly associated.[24] Recent systematic review found that research based on self-report or clinical bruxism diagnosis showed a positive association with TMD pain, but they have some potential bias and confused diagnostic level. Studies based on more quantitative and specific methods to diagnose bruxism showed much lower association between bruxism and TMD symptoms.[2]

This study has some limitations. First, enrolled subjects were diagnosed by one clinician. Therefore it was difficult to completely eliminate potential bias. Second, this study did not distinguish between SB and awake bruxism. Finally, due to retrospective design, cause and effect cannot be reliably evaluated.

Although bruxism is regarded as risk factor of TMD, this study showed inconsistent result between SRB and clinical detected bruxism. Further clinical study needs definitively

reliable methods for assessing bruxism in the clinic and to examine the clinical influence of bruxism on TMD symptoms and signs for successful TMD managements. We suggest that the clinician should consider with extreme caution when they assess SRB.

CONFLICT OF INTEREST

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

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