Oral health–related quality of life of patients with acute and chronic temporomandibular disorder diagnostic subtypes

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ABSTRACT

Background. Studies have indicated the negative effects of temporomandibular disorders (TMDs) on oral health–related quality of life (OHRQoL). The authors investigated the OHRQoL of patients with acute and chronic TMD subtypes.

Methods. The authors recruited a total of 830 patients. They derived TMD diagnoses using the Diagnostic Criteria for TMDs protocol involving symptom history, physical examination, and diagnostic imaging as indicated. The authors categorized patients into acute ($\leq$ 3 months) or chronic ($>$ 3 months) pain-related TMD (PT), nonpainful intra-articular TMD (IT), and combined TMD (CT) groups. They also gathered sociodemographic information and assessed OHRQoL with the Oral Health Impact Profile (OHIP)-TMDs. The authors evaluated data using 2-way analysis of variance and Bonferroni test and multiple regression analysis.

Results. Patients in the chronic PT and CT subgroups had significantly higher mean global OHIP scores than their acute counterparts. The authors observed significant acute-chronic differences in OHIP-TMDs domain scores in 5 and 2 domains for the PT and CT groups, respectively. Patients in the acute IT group had significantly higher functional limitation scores than those in the chronic IT group. The ranking of mean global scores, in descending order was CT, PT, and IT for acute TMDs and PT, CT, and IT for chronic TMDs, with significant differences observed among the 3 TMD subtypes ($P < .001$).

Conclusions. Both TMD chronicity and subtypes influenced OHRQoL. Painful TMDs (PT and CT) were associated with significantly poorer OHRQoL than nonpainful TMDs. TMD chronicity appeared to affect OHRQoL only for the painful TMD conditions. Future work on the impact of TMDs on OHRQoL should strive to stratify patients by TMD chronicity and subtypes.

Practical Implications. TMD chronicity and subtypes influence the impact of TMDs on OHRQoL. Given that chronic painful TMDs impair quality of life, early biopsychosocial intervention of acute TMD pain is important for minimizing chronification and OHRQoL deterioration.

Key Words. Temporomandibular disorders; acute; chronic; oral health–related quality of life; OHIP-TMDs.

JADA 2022:153(1):50-58
https://doi.org/10.1016/j.adaj.2021.07.011

Oral health–related quality of life (OHRQoL) is a conceptual model targeting patients' perceptions of oral health. It characterizes the structural, behavioral, and psychosocial consequences of oral disease using the framework of the World Health Organization International Classification of Impairments, Disabilities and Handicaps.[1-4] Owing to the peculiarity of oral structures, dental conditions can affect various aspects of life and impair quality of life. Over the past 2 decades, clinical and research interests in OHRQoL have increased considerably.[2,5-7] A gamut of generic and condition-specific measures was developed to examine OHRQoL.[6,8,9] The Oral Health Impact Profile (OHIP), which provides an assessment of various aspects of life quality, is probably the most comprehensive and widely used generic OHRQoL instrument. Durham and colleagues[10] introduced a condition-specific OHRQoL measure for temporomandibular disorders (TMDs) known as the OHIP-TMD, whose reliability, validity, and discriminative ability had been established in several studies.[11-13]

TMDs are the most common cause of nondental orofacial pain and refer to a group of conditions characterized by pain or dysfunction of the masticatory muscles or temporomandibular joints (TMJs). They are more common in women, with a prevalence rate ranging from 7.3% through 30.4%.[14,15] TMD symptoms often increase during adolescence and peak from age 20 through 40 years.[16-18] The Diagnostic Criteria for TMDs (DC/TMD) was presented in 2014 and is the contemporary standard for TMD diagnosis.[19] On the basis of the DC/TMD, TMD conditions can be categorized into pain-related TMDs (PTs) and nonpainful intra-articular TMDs (IT). Whereas PTs include myalgia, arthralgia, and headache attributed to TMDs, ITs consist of TMJ subluxation, disk displacements (DDs), and degenerative joint disease. Both PTs and ITs can be acute or chronic. Chronic TMDs occur when patients do not respond to treatment or symptoms persist for more than 3 months.[20,21] Chronic TMDs are often linked to higher levels of depression and physical symptoms reporting, as well as poorer sleep and life quality compared with acute conditions.[16,17,22-25]

Previous studies have indicated that the negative effect of TMDs on OHRQoL is dependent in part on the type and number of TMD symptoms.[26-29] Furthermore, the presence of both TMD muscle and joint conditions, longer pain duration, and greater pain interferences with daily living activities also have been associated with lower OHRQoL.[30] However, most of these studies did not differentiate between acute and chronic TMDs as well as TMD subtypes or use TMD-specific OHRQoL measures. The use of condition-specific instruments reduces so-called floor effects, as the items surveyed are obtained from the symptoms and outcomes of specific oral diseases and are more relevant as well as prevalent. Accordingly, the condition-specific measures also offer greater sensitivity, specificity, and responsiveness than generic measures.[3,31,32]

Thus, the objectives of our study were to explore the OHRQoL of patients with acute or chronic PTs or ITs. Furthermore, we aimed to determine the associations among TMD chronicity (acute, chronic), sex, age, and OHRQoL for the various TMD subtypes. A secondary aim was to establish the functional, physical, and psychosocial impairments related to the various TMD subtypes. The null hypotheses were that there were

- no differences in global and domain OHRQoL scores between patients with acute and chronic TMDs
- no differences in global and domain OHRQoL scores among patients with PTs, ITs, and combined TMDs (CTs)
- no associations among TMD chronicity (acute, chronic), sex, age, and global OHRQoL scores for the 3 TMD subtypes.

METHODS

Approval for this cross-sectional study was attained from the Biomedical Institutional Review Board of Peking University (PKUSSIRB-201732009). We invited 907 consecutive patients who came to the Center for TMD and Orofacial Pain at Peking University School and Hospital of Stomatology to participate in the study. We presented the details of the study to and obtained informed consent from the participants or their guardians if they were younger than 18 years. All participants underwent a standardized history intake, physical examination, and diagnosis by a trained TMD specialist based on the DC/TMDs.[19] The exclusion criteria were history or presence of

- TMD treatment in the past month (both nonsurgical and surgical including consumption of pain medications)
- major orofacial trauma or operations in a lifetime
- nonmedical drug abuse
- major psychiatric disorders (for example, personality and psychotic disorders)
- systemic or metabolic diseases (for example, multiple sclerosis)
- non-TMD joint or muscle diseases (for example, suppurative TMJ arthritis and myositis ossificans)
- cognitive impairment or illiteracy
- consumption of central nervous system agents (besides sleep medications)
- inability to recall the duration of TMD symptoms.

We derived TMD diagnoses from the DC/TMD symptom questionnaire and clinical examination using the DC/TMD diagnostic decision tree.[19] Cone-beam computed tomography (CBCT) was performed for patients with TMJ pain, sounds, or functional problems to confirm the diagnosis of TMJ degenerative joint disease. Magnetic resonance imaging (MRI) was not routinely used to

ABBREVIATION KEY

CBCT: Cone-beam computed tomography.
CT: Combined temporomandibular disorders.
DC/TMD: Diagnostic Criteria for Temporomandibular Disorders.
DD: Disk displacements.
IT: Nonpainful intra-articular temporomandibular disorders.
MRI: Magnetic resonance imaging.
OHIP: Oral Health Impact Profile.
OHRQoL: Oral health–related quality of life.
PT: Pain-related temporomandibular disorders.
TMD: Temporomandibular disorder.
TMJ: Temporomandibular joint.

Table 1. Descriptive characteristics of the participants.

DEMOGRAPHICS	PT*		IT†		CT‡		*P* VALUE	POST HOC TUKEY TEST
	Acute (N = 68)	Chronic (N = 44)	Acute (N = 111)	Chronic (N = 229)	Acute (N = 199)	Chronic (N = 179)		
Age, Mean (Standard Deviation), Y	40.49 (15.37)	40.73 (18.53)	30.14 (14.99)	25.65 (10.25)	34.25 (15.65)	30.72 (14.71)	< .001§	Acute PT, chronic PT > acute CT > acute IT, chronic CT > chronic IT
Male, No. (%)¶	26 (38.24)	7 (15.91)	25 (22.52)	59 (25.76)	32 (16.08)	25 (13.97)	< .001#	Acute PT versus acute CT/chronic CT
Female, No. (%)¶	42 (61.76)	37 (84.09)	86 (77.48)	170 (74.24)	167 (83.92)	154 (80.03)		
Duration, Mean (Standard Deviation), Mo	1.22 (0.95)	16.72 (15.57)	1.48 (0.91)	36.35 (41.46)	1.49 (0.93)	18.47 (23.68)	< .001§	Chronic IT > chronic PT Chronic IT > chronic CT

* PT: Pain-related temporomandibular disorders. † IT: Nonpainful intra-articular joint temporomandibular disorders. ‡ CT: Combined temporomandibular disorders. § Result of 1-way analysis of variance post hoc Tukey test ($P < .05$). ¶ No. (%) indicates the sex distribution in each group, and post hoc indicates acute PT group showed a significantly lower proportion of females than acute CT and chronic CT groups. # Result of χ^2 test ($P < .05$).

diagnose TMJ DDs and was indicated only if a patient's history and examination did not fulfill the criteria for ITs. We subsequently classified the patients into 3 groups on the basis of their primary diagnoses, namely, PT, IT, and CT. We further divided each TMD group on the basis of chronicity into acute ($\leq$ 3 months) and chronic ($>$ 3 months) according to the duration of TMD symptoms, resulting in a total of 6 subgroups.

We assessed OHRQoL with the validated Chinese version of OHIP-TMDs that had good internal (Cronbach α, 0.92) and test-retest (intraclass correlation coefficient, 0.90) reliability.[12] The OHIP-TMDs comprises 22 items and 7 domains (functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, handicap). Each item is scored using a 5-point response scale (ranging from 0 [never] through 4 [very often]). The global OHIP-TMDs score is calculated by means of totaling all the 7 domain scores. It ranges from 0 through 88, with larger scores signifying poorer OHRQoL.[10]

We analyzed the data using the Statistical Package for Social Sciences Version 28 (IBM), with the significance level set at *P* value of .05. We examined OHRQoL data with probability-probability plots and found them to be normally distributed. We compared mean age and pain duration using 1-way analysis of variance and Tukey post- hoc test. We examined sex distribution among the 3 pain groups with the χ^2 test. We analyzed differences in OHIP-TMDs scores among TMD subtypes (PT, IT, CT) and chronicity (acute, chronic) using 2-way analysis of variance followed by post hoc Bonferroni test. We examined associations among TMD chronicity (acute, chronic), sex, age, and global OHIP-TMDs scores for the various TMD subgroups with multiple regression analysis.

RESULTS

A total of 830 patients qualified for the study, giving a response rate of 91.51%. The frequency of acute and chronic conditions and characteristics of the 3 TMD groups are shown in Table 1. Whereas the CT group presented an almost equal distribution of acute and chronic participants, the PT group had more acute participants and the IT group had more chronic participants. The ranking of the mean age, in descending order, was PT, CT, and IT. We observed a female preponderance for all 6 subgroups. The acute PT group showed a significantly lower proportion of women than the acute CT and chronic CT groups ($P < .05$). The mean TMD symptom duration of the chronic IT group was significantly greater than that of the chronic PT and CT groups ($P < .05$).

The mean global OHIP-TMDs scores for the TMD subgroups are displayed in Table 2. Global OHIP-TMDs scores of the chronic PT and CT subgroups were higher than those of acute PT and CT subgroups, with significant interaction of TMD chronicity and subtypes ($P < .05$). We further explored global OHIP-TMDs scores via pairwise comparisons, and patients with acute and chronic PT and CT had significantly higher global scores than those with IT, and both chronic PT and CT groups had significantly higher global scores than their acute counterparts ($P < .05$), as presented in Table 3. Chronic CT and PT patients thus had the worst quality of life. Findings of multiple

Table 2. Mean (standard deviation [SD]) OHIP-TMDs* scores and *P* values of 2-way analysis of variance for the acute and chronic pain-related, nonpainful, intra-articular, and combined TMDs.†

VARIABLES	ACUTE PT‡	CHRONIC PT	ACUTE IT§	CHRONIC IT	ACUTE CT¶	CHRONIC CT	*P* VALUE
Global OHIP,# Mean (SD)	38.94 (20.16)	49.52 (23.26)	30.70 (16.65)	30.71 (16.61)	42.62 (16.80)	46.44 (17.43)	TMD subtypes** × chronicity†† interaction, .03‡‡ TMD subtypes main effect, < .001‡‡ Chronicity main effect, .001‡‡
OHIP-1, Functional Limitation, Mean (SD)	4.74 (2.24)	4.30 (2.53)	4.44 (2.19)	3.76 (2.13)	5.90 (1.83)	5.91 (1.88)	TMD subtypes × chronicity interaction, .06 TMD subtypes main effect, < .001‡‡ Chronicity main effect, .04‡‡
OHIP-2, Physical Pain, Mean (SD)	8.23 (4.43)	10.25 (5.27)	5.37 (3.31)	4.98 (3.79)	8.75 (3.92)	9.96 (4.17)	TMD subtypes × chronicity interaction, .02‡‡ TMD subtypes main effect, < .001‡‡ Chronicity main effect, .01‡‡
OHIP-3, Psychological Discomfort, Mean (SD)	8.63 (I4.87)	11.41 (4.98)	7.66 (4.51)	8.31 (4.40)	9.39 (4.09)	10.46 (4.06)	TMD subtypes × chronicity interaction, .09 TMD subtypes main effect, < .001‡‡ Chronicity main effect, < .001‡‡
OHIP-4, Physical Disability, Mean (SD)	3.72 (2.13)	3.86 (2.27)	2.92 (1.77)	3.04 (2.03)	4.36 (2.02)	4.64 (1.97)	TMD subtypes × chronicity interaction, .87 TMD subtypes main effect, < .001‡‡ Chronicity main effect, .27
OHIP-5, Psychological Disability, Mean (SD)	7.66 (5.62)	11.30 (6.45)	6.40 (5.19)	6.48 (4.90)	8.28 (4.89)	9.25 (5.35)	TMD subtypes × chronicity interaction, 0.01‡‡ TMD subtypes main effect, < .001‡‡ Chronicity main effect, < .001‡‡
OHIP-6, Social Disability, Mean (SD)	2.22 (2.33)	3.64 (3.01)	1.50 (1.85)	1.55 (1.89)	2.25 (2.08)	2.45 (2.20)	TMD subtypes × chronicity interaction, .01‡‡ TMD subtypes main effect, < .001‡‡ Chronicity main effect, .002‡‡
OHIP-7, Handicap, Mean (SD)	3.34 (2.51)	4.77 (2.85)	2.41 (2.27)	2.56 (2.14)	3.69 (2.32)	3.72 (2.46)	TMD subtypes × chronicity interaction, 0.02‡‡ TMD subtypes main effect, < .001‡‡ Chronicity main effect, 0.01‡‡

* OHIP-TMDs: Oral Health Impact Profile—Temporomandibular Disorders. † TMDs: Temporomandibular disorders. ‡ PT: Pain-related TMDs. § IT: Nonpainful intra-articular joint TMDs. ¶ CT: Combined TMDs. # OHIP: Oral Health Impact Profile. ** TMD subtypes represent PT, IT, and CT. †† Chronicity represents acute and chronic TMDs. ‡‡ Result of 2-way analysis of variance; $P < .05$.

Table 3. *P* values of 2-way analysis of variance pairwise comparisons.

COMPARISONS	GLOBAL OHIP*	OHIP-1, FUNCTIONAL LIMITATION	OHIP-2, PHYSICAL PAIN	OHIP-3, PSYCHOLOGICAL DISCOMFORT	OHIP-4, PHYSICAL DISABILITY	OHIP-5, PSYCHOLOGICAL DISABILITY	OHIP-6, SOCIAL DISABILITY	OHIP-7, HANDICAP
TMD† Subtypes‡								
Acute								
PT versus IT	< .007§	> .999	< .001§	.44	.03§	.34	.08	.03§
PT versus CT	.41	< .001§	> .999	.64	.07	> .999	> .999	.84
IT versus CT	< .001§	< .001§	< .001§	.002§	< .001§	.01§	.01§	< .001§
Chronic								
PT versus IT	< .001§	.35	< .001§	< .001§	.04§	< .001§	< .001§	< .001§
PT versus CT	.89	< .001§	> .999	.59	.07	.06	.002§	.02§
IT versus CT	< .001§	< .001§	< .001§	< .001§	< .001§	< .001§	< .001§	< .001§
TMD Chronicity								
PT: acute versus chronic	.002§	.27	.04§	.001§	.72	< .001§	.001§	.002§
IT: acute versus chronic	.99	.004#	.40	.20	.59	.89	.85	.59
CT: acute versus chronic	.04§	.73	.003§	.02§	.19	.07	.37	.93

* OHIP: Oral Health Impact Profile. † TMD: Temporomandibular disorder. ‡ TMD subtypes represent pain-related TMDs (PT), nonpainful intra-articular joint TMDS (IT), and combined TMDs (CTs). § Result of 2-way analysis of variance and Bonferroni pairwise comparisons; $P < .05$.

Table 4. Multiple regression analysis of TMD* chronicity.

TMD SUBTYPE†	VARIABLE	MULTIPLE REGRESSION	
		Coefficient	*P* Value
Pain-Related TMD	TMD chronicity	9.888	.022†
	Sex	2.913	.525
	Age	0.177	.150
Nonpainful Intra-articular Joint TMD	TMD chronicity	0.566	.771
	Sex	3.068	.142
	Age	0.109	.148
Combined TMD	TMD chronicity	4.115	.020†
	Sex	3.517	.152
	Age	0.105	.069

* TMD: Temporomandibular disorder. † Significant differences between the groups; $P < .05$.

Table 5. Reliability testing of the OHIP—temporomandibular disorders*.

SUBSCALE	CRONBACH α
Global OHIP	0.950
OHIP-1, Functional Limitation	0.742
OHIP-2, Physical Pain	0.789
OHIP-3, Psychological Discomfort	0.880
OHIP-4, Physical Disability	0.641
OHIP-5, Psychological Disability	0.903
OHIP-6, Social Disability	0.801
OHIP-7, Handicap	0.803

* OHIP: Oral Health Impact Profile.

regression analysis (Table 4) indicated that TMD chronicity was associated with global OHIP-TMDs scores for the PT and CT groups ($P < .05$).

We calculated the internal consistency of the 7 OHIP-TMDs domains to confirm reliability; the data are displayed in Table 5. Cronbach α for global OHIP-TMDs was 0.950, and values for the domains ranged from 0.641 for physical disability through 0.903 for psychological disability. All subscales exceeded the minimum reliability standard of 0.70, except the physical disability subscale, whose value of 0.641 nearly reached the threshold. For the physical pain, psychological disability, social disability, and handicap domains, we observed significant interactions of TMD chronicity and subtypes ($P < .05$), and the data are shown in Table 2. For the functional limitation, psychological discomfort, and physical disability domains, we found no significant interactions between TMD chronicity and subtypes. We observed significant main effects of TMD chronicity and subtypes for the functional limitation and psychological discomfort domains ($P < .05$), whereas we only perceived a significant main effect of TMD subtypes for the physical disability domain ($P < .05$); the data are displayed in Table 2. We also performed pairwise comparisons of domain scores among the 3 TMD subtypes, as well as between acute and chronic TMDs, as shown in Table 3. Significant differences in domain scores between TMD subtypes varied depending on symptom chronicity. We observed significant differences in domain scores between acute and chronic PT for the following domains: physical pain, psychological disability, social disability, and handicap ($P < .05$). For the IT group, we noted acute-chronic differences for only the functional limitation domain. We observed significant differences in scores between patients with acute and chronic CT for the physical pain and psychological discomfort domains ($P < .05$).

DISCUSSION

Overview and OHRQoL measure

This cross-sectional study is one of the largest on Asian patients with TMD using the protocolized DC/TMD standards. We determined the impact of various acute and chronic TMD subtypes on OHRQoL and established the relationships among TMD chronicity (acute, chronic), subtype (PT, IT, CT), and OHRQoL. As we detected significant differences in OHRQoL among different TMD chronicity and subtypes, we duly discarded the first and second null hypotheses. We also rejected the third null hypothesis because we observed associations between TMD chronicity and global scores. The mean age and greater portion of women observed in our study were congruent with prior knowledge about TMDs.[17,33] Of consequence was the significantly longer symptom duration of the IT group compared with the PT and CT groups at presentation. Thus, patients with painful TMDs (that is, PT and CT groups) are seeking treatment earlier than those with only IT problems, supporting the notion that pain is the major motivation for seeking treatment.[34]

Although the OHIP-49 is a well-established tool for evaluating the impact of oral diseases, the OHIP-14 is more popular and commonly used for oral health and TMD research.[26,28,35-37] However, several items of OHIP-14, including pronunciation and sense of taste, may not be related to TMDs and can affect the validity of findings. The OHIP-TMDs is the only patient-centered OHRQoL measure for TMDs available and applicable to both research and clinical settings. It is substantially shorter and contains proportionately more TMD-pertinent items.[11,12]

Comparison of acute and chronic TMDs

The PT and CT groups had significant differences in mean global scores between acute and chronic TMDs. Patients in the chronic PT group reported the poorest OHRQoL with the largest number of compromised domains. For both PT and CT groups, chronicity was associated largely with higher OHIP-TMDs domain scores. Only the psychosocial domains were affected, and we observed no significant differences in functional limitation and physical disability domain scores between patients with acute and chronic PT. For the CT group, in which both PTs and ITs were present, we noted significant differences between acute and chronic states for the physical pain and psychological discomfort domains. Our findings are consistent with those of earlier studies that suggested that pain negatively affected both physical and psychosocial domains of patients with TMD. A large number of studies have confirmed the existence of psychological problems in patients with chronic pain; meanwhile, psychological distress has been shown to affect pain chronification.[38-40] Apart from functional limitations, the differences in domain scores between acute and chronic IT groups were statistically insignificant. The acute IT group had significantly higher functional limitation scores than the chronic IT group, suggesting that ITs are self-limiting and may improve over time. As an example, patients with acute TMJ DDs without reduction may experience improved mouth opening over time.[41]

Comparison of PT, IT, and CT

In both acute and chronic states, patients with painful TMDs (that is, PT and CT) reported significantly poorer OHRQoL than those with only ITs. Our finding corroborates that of Reissmann and colleagues,[42] who determined that patients with PT conditions had higher OHRQoL scores than those who were pain free. Other studies have indicated that quality of life is related more to masticatory muscle and joint pain than ITs in patients with TMD.[30,43,44] Moreover, TMD-related pain is reported to be associated significantly with poorer OHRQoL in Chinese community samples.[45] Dahlström and Carlsson,[46] in their systematic review, concluded that pain has a considerable bearing on OHRQoL and the impact is more pronounced in patients with more TMD signs and symptoms.[46]

We also observed significant differences in OHIP-TMDs domain scores among the 3 TMD subtypes. In both acute and chronic states, patients with CT experienced significantly poorer OHRQoL in all domains compared with those with only IT that usually have favorable prospects with no major pain or dysfunction.[47] Significant differences in domain scores between PT and IT varied depending on TMD duration. Although physical pain and handicap remained significantly different between the PT and IT groups with TMD chronicity, the psychosocial well-being (that is, psychological discomfort, psychological, and social disability) of PT patients appeared to

deteriorate. This was congruent with the work of Canales and colleagues,[48] who found that patients with chronic TMD have a high level of pain-related impairment and moderate to high levels of depression and physical symptoms reporting.[48]

We noted a significant difference in functional limitation scores between patients with PT and CT. For both acute and chronic states, the CT group had significantly higher scores than the PT group, signifying that those patients with comorbid PT and ITs had more functional issues that affected life quality. The significantly higher social disability and handicap scores of the chronic PT group compared with those with chronic CT may be the result of contributions by other factors including fatigue and pain.[49] Together, our study and the available evidence suggest that the OHRQoL of patients with TMD is influenced by the type, number, chronicity, and perception of TMD signs and symptoms. As patients with chronic painful TMDs have the worst quality of life, the early biopsychosocial intervention in acute TMD pain is important for minimizing chronification and OHRQoL deterioration.

Associations among TMD chronicity, sex, age, and OHRQoL

Although the validity of discrete DC/TMD diagnoses may vary, the grouping of patients into PT, IT, and CT groups and the relatively large sample size of our study could mitigate this problem and any subsequent analyses. Multiple regression analysis suggested that sex and age were not related to the various TMD subtypes. For PT and CT, chronicity was associated with significantly more impaired OHRQoL. We did not observe this association in patients with ITs. The relationship between TMD chronicity and OHRQoL is, therefore, complex and may be dependent on the perception and subsequent appraisal of TMD signs and symptoms by patients.[49] As pain duration increases, there is a shift from primarily somatosensory to psychosocial inputs of pain, with greater levels of distress and pain, as well as more care-seeking behaviors.[50,51] Although the biopsychosocial model addresses the latter issues, clinical frameworks supporting it have not been adopted widely for TMD management owing to several barriers, including cultural-societal stigma, health literacy, and health service settings.[51] As TMD patients with similar diagnoses may be affected in different ways, a paradigm shift from solely objective assessments and outcome measures to more holistic and patient-centric approaches addressing patients' expectations, care experience, and OHRQoL is warranted.[52] An abbreviated OHIP-TMDs would be beneficial for this purpose.

Study limitations and future work

Despite the meaningful findings, our study had several limitations. First, for patients with joint-related symptoms, we obtained imaging examination via CBCT and diagnosed degenerative joint disease according to the CBCT findings. We did not conduct MRI routinely, and we diagnosed internal derangements, including DD with reduction, intermittent locking, and DD without reduction, according to the DC/TMD protocol. We used MRI to confirm if patient history and examination did not meet the DC/TMD but internal derangement was suspected. Although highly specificity of clinical diagnosis based on DC/TMD, low sensitivity may cause a failure diagnosis of internal derangement. The limitation may have resulted in magnification of the number of the PT group and reduction of the number of the CT group. Second, the causal relation between TMD chronicity and subtype and OHRQoL could not be established owing to the cross-sectional design. Furthermore, a bidirectional relationship may exist between TMD duration and OHRQoL, especially for the psychological and physical domains. The presence of other oral conditions such as caries or tooth loss and periodontal disease might also affect OHRQoL but were not examined.[53] Third, given that the OHIP-TMDs is a patient self-reported measure, it is subject to different sources of bias including social desirability, recall, and confirmation prejudices.[54] Nonetheless, the validity and reliability of the Chinese OHIP-TMDs have been established, and the reliability of global OHIP-TMDs and most domains have been found to be good. Fourth, OHIP-TMDs was examined using mean scores that may "mask important and potentially different patterns in responses" among the various groups.[55] Moreover, mean OHIP-TMDs scores are hard to interpret given the lack of a "meaningful benchmark."[55] Tsakos and colleagues[55] recommended the use of the minimally important difference as a point of reference and multiple scoring formats (that is, severity, extent, and prevalence) to enhance the interpretability of OHRQoL data. Lastly, our relatively strict exclusion criteria created a more homogenous study group and stronger internal validity. However, the external validity and the application of our findings to the general population may be

affected. Future similar studies ideally should be longitudinal in design and encompass the reporting of other oral conditions, psychological factors, and sleep status, as well as patients' pain and expectations.

CONCLUSIONS

Our study indicated that the OHRQoL of patients with TMD is related to both TMD chronicity (acute, chronic) and subtypes. Early biopsychosocial intervention in acute TMD pain is prudent to minimize pain chronification and decline in OHRQoL. Future work on the impact of TMDs on OHRQoL thus should strive to stratify patients by both TMD subtypes and duration. Routine assessment of OHRQoL is recommended for patients with painful TMDs, and this will be facilitated by a short-form version of the OHIP-TMDs. ■

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Disclosures. None of the authors reported any disclosures.

This work was supported by grant Z141107002514157 of the Capital Clinical Research Project from the Beijing Municipal Science and Technology Commission and grant 2020-4-4106 of the Capital Health Research and Development of Special Fund Program from Beijing Municipal Health Commission.

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