

# Comparison of Clinical Symptoms and Psychological Profiles of Temporomandibular Joint Osteoarthritis between Juveniles and Adults

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**Purpose:** The purpose of this study was to compare the differences in clinical signs and symptoms, and psychological profiles of temporomandibular joint osteoarthritis (TMJ OA) between juvenile and adult patients.

**Methods:** Two-hundred eighty-three TMJ OA patients who visited the Orofacial Pain Clinic of Seoul National University Dental Hospital were classified by juvenile (153 patients; mean age  $14.2 \pm 1.7$  years, range 9-16 years) and adult (130 patients; mean age  $34.0 \pm 2.8$  years, range 30-40 years) groups, and compared the clinical symptoms based on the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) axis I guidelines including Graded Chronic Pain (GCP) scale, mandibular range of motion, and the associated symptoms. Psychological profiles were also evaluated using the Symptom Checklist 90-Revision (SCL-90-R).

**Results:** Juvenile patients reported lower pain intensity and a lower prevalence of headache and clenching than adult patients. Their mandibular range of motion was also higher than adult patients. Juvenile patients showed a lower percentage of patients with T-score above 50 in somatization (SOM), obsessive-compulsive (O-C), interpersonal sensitivity (I-S), and paranoid ideation (PAR) than adults. Based on the GCP scale, the percentage of the high disability group was lower in juveniles.

**Conclusions:** Juvenile TMJ OA patients generally showed milder clinical symptoms than adults. Adult patients showed higher prevalence of psychological problems and higher disability than juvenile patients. Age should be considered in evaluation and treatment of TMJ OA patients to achieve better treatment results and understanding its pathophysiology.

**Key Words:** Adult; Juvenile; Osteoarthritis; Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD); Temporomandibular joint disorders

## INTRODUCTION

Temporomandibular disorders (TMD) include considerable clinical problems involving the masticatory muscles, the temporomandibular joint (TMJ), and the associated structures.<sup>1)</sup> The etiology of TMD is considered as multifactorial; however, the relative importance of the personal factors remains controversial. TMD signs may be by different

psychosocial and/or physiological factors such as masticatory muscle problems, trauma to the orofacial area, micro-trauma owing to parafunctional habits, and psychological stress.<sup>2,3)</sup> In addition to the disability of stomatognathic function, patients with TMD often complain increased pain sensitivity and psychological dysfunction because of its chronic nature.<sup>4)</sup>

TMJ osteoarthritis (TMJ OA) is a common condition of

TMD caused by wear of articular facet of TMJ with destruction of subchondral bone and changes of synovial fluid.<sup>5-7)</sup> In TMJ OA patients symptoms can progress as a consequence of the joint cartilage destruction and the following release of degraded proteoglycans and proteolytic enzymes into the synovial fluid, causing further degradation and a secondary inflammation.<sup>8-10)</sup>

The prevalence of TMJ OA has been reported approximately 8% to 16% of general population and joint involvement may be unilateral or bilateral.<sup>11-13)</sup> The etiology of TMJ OA is unclear, though much is known about events and its affecting factors.<sup>5,9,10,14)</sup> Biomechanical overload on the articular surface of TMJ is considered as primary etiological factor of TMJ OA.<sup>15)</sup> Sleep bruxism and unilateral chewing leading to repetitive microtrauma to the joints could increase the joint overloading. General factors, genetic factors, and age have been suggested for the etiological factors of TMJ OA.<sup>5)</sup>

Several studies on the age differences in the clinical symptoms of TMD have been reported especially juvenile and adults. In juvenile TMD patients, joint sounds were observed in 7%, and muscle pain in 25% while adult patients recorded joint sounds in 38% and muscle pain in 12%. These studies suggest that the signs and symptoms of TMD might differ between juvenile and adult groups.<sup>16,17)</sup>

As people become aged, not only the physical status such as soft and hard tissues but also psychological and social status undergoes change. Many studies have reported that psychological factors may be involved in the initiation and progress of TMD symptoms. For the successful treatment of TMD, evaluation of psychological status of the patient should be considered.

The Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) is reliable and valid diagnostic criteria. The RDC/TMD consists of dual axis system. The axis I demonstrate a clinical diagnosis based on pathophysiology whereas axis II assess pain-related disability and psychosocial status. Axis II assess and classify the global severity of the pain condition using Graded Chronic Pain (GCP) scale and Symptom Checklist 90-Revision (SCL-90-R).<sup>18,19)</sup>

The purpose of this study was to compare the differences in clinical signs and symptoms, and psychological profiles of TMJ OA between juvenile and adult patients.

## MATERIALS AND METHODS

### 1. Subjects

Two-hundred eighty-three patients diagnosed with TMJ OA on computed tomography who visited the Orofacial Pain Clinic of Seoul National University Dental Hospital from February 2005 to February 2012 were studied.

Subjects were classified by juvenile (153 patients; mean age 14.2±1.7 years, range 9-16 years) and adult (130 patients; mean age 34.0±2.8 years, range 30-40 years) groups. Patients with rheumatoid arthritis, history of facial and jaw bone fracture, and orthognathic surgery were excluded in the study.

The research protocol was approved by the Institutional Review Board of the Seoul National University Dental Hospital.

### 2. Clinical Symptoms and Graded Chronic Pain Scale

Each subject was examined their clinical symptoms based on the RDC/TMD guideline including pain intensity, maximum mouth opening (MMO), comfortable mouth opening (CMO), parafunctional habits (clenching, sleep bruxism), and related symptoms (headache, tinnitus). Chronic pain severity and related disability were analyzed with the GCP scale.<sup>20)</sup>

The GCP scale includes 7 questions: characteristic pain intensity (mean of visual analogue scale derived from 3 questions including pain now, worst pain during last 6 months, and average pain during last 6 months), disability score (0-100 score derived from 3 questions including interferences in daily, social, and work activities), and disability days (Table 1). GCP scale is classified to five grades (Table 2).

**Table 1.** Disability points of Graded Chronic Pain scale

Variable	Point
Disability days (0-180)	
0-6	0
7-14	1
15-30	2
≥31	3
Disability score (0-100)	
0-29	0
30-49	1
50-69	2
≥70	3

**Table 2.** Graded Chronic Pain scale classification

Grade	Criteria
0	No temporomandibular disorders pain in prior 6 mo
I (low intensity) <sup>a</sup>	Characteristic pain intensity <50, and less than 3 disability points
II (high intensity) <sup>a</sup>	Characteristic pain intensity >50, and less than 3 disability points
III (moderately limiting) <sup>b</sup>	3-4 Disability points, regardless of characteristic pain intensity
IV (severely limiting) <sup>b</sup>	5-6 Disability points regardless of characteristic pain intensity

<sup>a</sup>Low disability. <sup>b</sup>High disability.

### 3. Radiographic Evaluation

TMJ OA is defined by inflammatory condition of the TMJ with degenerative symptoms including erosion, generalized sclerosis, or osteophyte on the mandibular condyle.

All the radiographic evaluation was performed on the computed tomography and diagnosed by oral and maxillo-facial radiologist.

### 4. Psychological Profiles

Psychological profiles was performed based on the SCL-90-R. SCL-90-R is consisted of 90 questions evaluating 9 symptom dimensions: somatization (SOM), obsessive-compulsive (O-C), interpersonal sensitivity (I-S), depression (DEP), anxiety (ANX), hostility (HOS), phobic anxiety (PHOB), paranoid ideation (PAR), and psychoticism (PSY) and 3 global distress indices: Global Severity Index (GSI), Positive Symptom Total (PST), and Positive Symptom Distress Index (PSDI).<sup>21)</sup>

### 5. Statistical Analyses

Differences in demographic and clinical features, and T-score of each symptom dimension of SCL-90-R between two groups were analyzed by independent t-test. Chi-square test was used for assessing differences in headache, tinnitus, clenching, sleep bruxism, percentage distributions of GCP scale between the groups, and percentage of patients with T-score above 50 in each dimension of SCL-90-R.

## RESULTS

### 1. Demographic Feature

Demographic features of the patients were shown in Table 3. The prevalence of TMJ OA in adult group was 9 times higher in women (91.5%) than in men (8.5%). In juvenile group the prevalence of TMJ OA was 4 times higher in women

**Table 3.** Demographic features of the patients

Variable	Juvenile	Adult	p-value
Age (y)	14.2±1.7	34.0±2.8	<0.001 <sup>a</sup>
Gender (%)			<0.001 <sup>b</sup>
Male	21.6	8.5	
Female	78.4	91.5	

Values are presented as mean±standard deviation.

<sup>a</sup>p-values were obtained from independent t-test.

<sup>b</sup>p-values were obtained from chi-square test.

**Table 4.** Comparison of clinical symptoms and Graded Chronic Pain (GCP) scale

Variable	Juvenile	Adult	p-value
Pain intensity	3.5±2.0	3.4±2.2	0.326 <sup>a</sup>
CMO (mm)	40.8±10.1	36.9±11.1	<0.001 <sup>a</sup>
MMO (mm)	44.4±9.1	41.0±9.5	0.032 <sup>a</sup>
GCP scale (%)			
0	0.0	17.5	<0.001 <sup>b</sup>
I	60.0	31.7	
II	36.0	17.5	
III	4.0	12.7	
IV	0.0	20.6	

CMO, comfortable mouth opening; MMO, maximum mouth opening.

Values are presented as mean±standard deviation.

<sup>a</sup>p-values were obtained from independent t-test.

<sup>b</sup>p-values were obtained from chi-square test.

(78.4%) than in men (21.6%).

### 2. Clinical Symptoms and Graded Chronic Pain Scale

Comparisons of clinical symptoms and GCP scale between two groups are shown in Table 4. There were no significant differences in pain intensity and MMO between juvenile and adults group. The juvenile group showed significantly higher CMO than adult group. Based on the GCP scale, the percentage of the high disability group (grade III and IV) was significantly lower in juvenile than adult group.

Table 5 shows the differences in the prevalence of para-functional habits (clenching, sleep bruxism) and related

**Table 5.** Differences in the prevalence of parafunctional habits and related symptoms

Variable	Juvenile	Adult	p-value
Clenching	22.7	49.8	<0.001
Sleep bruxism	31.1	25.1	0.156
Headache	14.1	61.3	<0.001
Tinnitus	7.9	36.1	<0.001

Values are presented as %.  
p-values were obtained from chi-square test.

**Table 6.** Differences in T-score of each dimension of SCL-90-R

Dimension	Juvenile	Adult	p-value
SOM	44.3±8.3	46.0±7.7	0.064
O-C	42.2±9.4	44.7±8.3	0.010
I-S	40.8±8.3	44.5±7.8	<0.001
DEP	45.7±38.2	43.5±8.2	0.516
ANX	46.8±41.9	42.9±6.6	0.294
HOS	44.4±9.5	48.9±34.1	0.077
PHOB	44.2±7.7	47.4±36.7	0.328
PAR	41.2±8.5	43.2±6.8	0.015
PSY	42.5±6.7	43.4±5.7	0.178

SCL-90-R, Symptom Checklist 90-Revision; SOM, somatization; O-C, obsessive-compulsive; I-S, interpersonal sensitivity; DEP, depression; ANX, anxiety; HOS, hostility; PHOB, phobic anxiety; PAR, paranoid ideation; PSY, psychoticism.

Values are presented as mean ± standard deviation.  
p-values were obtained from independent t-test.

symptoms (headache, tinnitus) between two groups. Juvenile group reported lower prevalence of clenching, headache, and tinnitus than adult group. There was no significant differences in the prevalence of sleep bruxism between two groups.

### 3. Psychological Profiles

Differences in T-score of each dimension of SCL-90-R are shown in Table 6. Adult group showed significantly higher scores of O-C, I-S, and PAR dimensions of SCL-90-R than juvenile group.

Table 7 showed differences in percentage of patients with T-score above 50 in each dimension of SCL-90-R. Adult group showed significantly higher percentage of patients with T-score above 50 in SOM, O-C, I-S, and PAR than juvenile group.

## DISCUSSION

Usually in the patients with TMJ OA, severe pain and

**Table 7.** Differences in percentage of patients with T-score above 50 in each dimension of SCL-90-R

Dimension	Juvenile	Adult	p-value
SOM	18.6	27.8	0.049
O-C	15.7	25.8	0.025
I-S	12.9	26.8	0.002
DEP	15.7	20.1	0.300
ANX	12.9	13.4	0.884
HOS	21.4	23.9	0.587
PHOB	12.9	19.1	0.122
PAR	5.7	16.3	0.003
PSY	10.0	17.2	0.059

SCL-90-R, Symptom Checklist 90-Revision; SOM, somatization; O-C, obsessive-compulsive; I-S, interpersonal sensitivity; DEP, depression; ANX, anxiety; HOS, hostility; PHOB, phobic anxiety; PAR, paranoid ideation; PSY, psychoticism.

Values are presented as %.  
p-values were obtained from independent t-test.

damaged function can progress<sup>5)</sup> as a consequence of the joint cartilage destruction causing further degradation and a secondary inflammation.<sup>8-10)</sup> But the juvenile TMJ OA may accompany with relatively little pain and devote to delayed diagnosis.<sup>22,23)</sup> In our study, there was no significant differences in pain intensity and CMO between juvenile and adult groups, but juvenile group showed lower disabilities than adult group.

Our study showed that the prevalence of TMJ OA was significantly higher in women than men in both juvenile and adult groups. The female predominance in TMJ OA reported in this study is consistent with previous studies. Interestingly, adult group showed significantly higher women prevalence (about 9 times) than juveniles (about 4 times) in our study.

Clenching and sleep bruxism have been suggested as a major contributing factors for TMD. In our study, adult group showed higher prevalence of clenching but there was no significant differences in the prevalence of sleep bruxism.

The pathophysiology of headache associated with TMD is not clearly explained but it is suggested that chronic TMD symptoms may enhance general pain sensitivity and may contribute to the occurrence of headache. Also, muscular disorders of TMD is the potential risk factors of tension-type headache. Our study showed adult group showed higher prevalence of headache than juvenile group. We speculated that higher prevalence of myogenous pain in adult than

juvenile group might contribute the predominance of headache in adult group (data were not shown in the results).

Tinnitus has been reported as a common symptom in TMD patients. The etiology of tinnitus in TMD patients is controversial. Generally, it is reported that tinnitus increased with age and showed a peak in the 60-year-old age group. Our study also showed prevalence of tinnitus was significantly higher in adult than juvenile group.

TMD is a multi-factorial disorder associated with both somatic and psychological consequences. Therefore the symptoms related biological and psychosocial characteristics should be considered for management of TMD patients. Our study evaluated the clinical signs and symptoms of TMJ OA patients based on RDC/TMD and psychosocial characteristics. Adult group showed higher level of disability in the graded chronic pain than juvenile group. The graded pain status have association with behavioral endurance pattern and psychological characteristics.

In general, TMJ OA patients have been reported to show increased somatization, depression, anxiety, and stress index. Interestingly, our analysis showed that juvenile group had lower T-scores of O-C and I-S dimension in SCL-90-R than adult group. Moreover, our data showed that juvenile showed lower percentage of patients with T-score above 50 in O-C, I-S, SOM, and PAR than adults. Based on this analysis, our study speculates that adult TMJ OA patients may tend to have more psychological problems than juvenile patients.

Our study has several limitations, in particular the retrospective design and the possibilities of limited diagnosis for children and teenager's expression of symptoms is diverse and insufficient, and sometimes clinical assessments may be difficult to diagnose.<sup>24)</sup>

In conclusion, juvenile TMJ OA patients generally showed milder clinical symptoms than adults. Adult patients showed higher prevalence of psychological problems and higher disability than juvenile patients. Age should be considered in evaluation and treatment of TMJ OA patients to achieve better treatment results and understanding its pathophysiology.

## CONFLICT OF INTEREST

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

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