

Epidemiological Study on Temporomandibular Disorders Using Research Diagnostic Criteria for TMD (RDC/TMD)

Ji-Yeon Ahn¹, Jong-Wan Kim¹, and Young-Kyun Kim²

Department of Orthodontics¹,
Department of Oral and Maxillofacial Surgery²,
Dentistry Section, Seoul National University Bundang Hospital

Corresponding Author

Young-Kyun Kim

Department of Oral and Maxillofacial Surgery, Dentistry Section, Seoul National University Bundang Hospital, 300 Gumi-Dong, Bundang-Gu, Sungnam-Si, Gyunggi-Do, 110-749, Korea
Tel: 82-31-787-7541, Fax: 82-31-787-4068, E-mail: kyk0505@snuh.org

• Abstract

Purpose : This epidemiological research was conducted to investigate the relationship between the groups of TMD and the behavioral, psychological, and physical symptoms through RDC/TMD.

Subjects and Methods : The subjects of this research were the 286 patients who had visited Seoul National University Bundang Hospital; their common chief complaint was temporomandibular discomfort. The mean age of the patients was 32.9 from 11 to 85, and the number of men and women was 67 and 219, respectively. The patients were examined through clinical and radiological methods and diagnosed by 1 investigator. They were divided into 3 groups: myogenous group (group 1), arthrogenous group (group 2), and combined group (group 3). The behavioral, psychological, and physical symptoms were evaluated through questionnaires on RDC/TMD. Specific items were selected to calculate the graded chronic pain (characteristic pain intensity, disability points), jaw disability, depression, and non-specific physical symptoms (pain items included/excluded) in the questionnaire. One-way ANOVA, Kruskal-Wallis test, and chi-square test were applied as statistical methods.

Results : As a result of classifying temporomandibular disorder in this study, the patients were distributed as follows: 9.1% of group 1, 79.7% of group 2, and 11.2% of group 3. In the analysis of graded chronic pain (characteristic pain intensity, disability points), jaw disability, and non-specific physical symptoms (pain items included/excluded), group 3 had the highest score, and the difference was significant ($p < 0.001$). Moreover, the depression score of group 3 was significantly higher than groups 1 and 2 ($p < 0.05$). Note that that the second order of jaw disability score was group 2, on the other hand, those of the other groups were group 1.

Conclusion : Myofascial pain could be assumed to be related closely to the behavioral, psychological, and physical symptoms except jaw disability compared to joint pain through RDC/TMD.

• **Keywords :** temporomandibular disorders (TMD), research diagnostic criteria for TMD (RDC/TMD), myogenous group, arthrogenous group, combined group, graded chronic pain (characteristic pain intensity, disability points), jaw disability, depression, non-specific physical symptoms (pain items included/excluded)

I . Introduction

As a very general concept covering various clinical problems including dysmorphia of the articular disc or mandibular condyle, disc displacement or dislocation, inflammation in the soft tissue (e.g., synovitis and capsulitis), osteoarthritis, osteoarthritis, and spasms, Temporomandibular Disorders (TMD) have noticeable symptoms of consistent, recurring, and chronic pain and joint noise from the hard and soft tissue of the facial and masticatory areas and limited mandibular movement.¹⁻³⁾ In the past, TMD was regarded as one symptom. Currently, it can be divided into many categories such as masticatory muscle disorders, joint disorders, chronic mandibular movement problems, and growth disorders given the progress in mandibular epidemiology including functional anatomy and neurophysiology of the stomatognathic system. In other words, the term “temporomandibular disorder” does not mean a specific malady; rather, it is used as a general term for various disorders.⁴⁾

Recent related studies classify TMD as diagnostic subgroups, and they have attempted to analyze the character of each subgroup. Through the Minnesota Multiphasic Personality Inventory (MMPI), Eversole, et al⁵⁾ targeted patients grouped into the muscular pain group and temporomandibular pain syndrome group. The muscular pain group was found to have scored higher than the other pain syndrome group on various clinical criteria. Furthermore, Truelove, et al⁶⁾ conducted a psychological test on the muscular pain group, pain syndrome group, and degenerative arthritis group and found that the muscular pain group scored higher in anxiety, depression, and physical index. On the other hand, Marbach and Lund⁷⁾ classified patients with facial pains into 3 groups: muscular pain group, temporomandibular arthritis group, and neuralgia group. In the measurements of anxiety and depression, no significant difference was found between the muscular pain group and temporomandibular arthritis group; thus exhibiting similarity to normal levels. In this study, we need to pay attention to the point that the highest frequency among the diagnostic subgroups is found in the muscular pain group and articular pain group, and that a significant difference is observed in terms of pathogenesis, symptoms, treatment method, and prognosis. Thus, in the assessment of temporomandibular disorders, the two groups are necessarily distinctive.

On the other hand, pain is a main symptom of temporomandibular disorders; at the same time, it is the most common factor that prompts patients to go to a clinic.⁸⁾ In particular, chronic pains are related to behavioral, psychological, and social factors; for the precise assessment of temporomandibular disorder, however, biobehavioral factor should be included.⁹⁾ Nonetheless, few attempts have been made on the diagnosis of temporomandibular disorders and relevant factors. From this perspective, the multiaxial classification system developed by the International Association for the Study of Pain (IASP) and Multidimensional Pain Inventory (MPI) devised by Turk and Rudy are highly useful. Considering the classification of temporomandibular disorders, however, they are not specific enough; they also offer a limited classification, i.e., behavioral and psychosocial factors only.^{10,11)}

In an attempt to resolve this constraint, Dworkin, et al¹²⁾ proposed the Research Diagnostic Criteria for Temporomandibular Disorder (RDC/TMD). This consists of the two-axial system: Axis I for the diagnosis of temporomandibular disorders, and; Axis II for the behavioral, psychological, and physical factors. Called depression criteria, Axis II defines the difficult points for systematic measurements in clinical studies and offers scientifically proven reliability in the assessments of symptoms/signs of temporomandibular disorders.¹³⁾

Dworkin, et al¹²⁾ introduced RDC/TMD and conducted a study to verify the reliability, validity, and clinical usability with regard to all items of Axis II. Furthermore, Yap, et al¹⁴⁾ and Lundeen, et al¹⁵⁾ used RDC/TMD as a tool for comparing the psychological aspect of each subgroup and treatment result. Still, the individual study results lack consistency. Relevant studies are also rare in Korea. Therefore, this study sought to examine the expressive difference in the behavioral, psychological, and physical symptoms of the diagnostic subgroups of temporomandibular disorders using RDC/TMD.

II . Target and Method

This study was conducted from January to December 2005, targeting 286 patients who had visited Bundang Hospital of Seoul National University to address their discomfort in the temporomandibular joints or masticatory muscles. The mean age of the targets was 32.87 ± 14.55 , and there were

67 males and 219 females. The mouth opening form, mandibular movement scope, joint noise, and pain in joints or masticatory muscles of individual patients were examined. As a diagnostic technique for the observation of the anatomical form and opening shape of temporomandibular joints, panoramic radiographic scan and transcranial projection were used.

Depending on the clinical and radiographic views, the targets were classified into 3 groups: Group 1 was the myogenous group with masticatory pain during functioning or facilitation but without specific symptom or lesion; Group 2 was the arthrogenous group without masticatory symptoms but had joint noise, condylar locking, or arthritic pain and with lesion in the joints as observed in the radiographic view; Lastly, Group 3 was the combined group with both muscular disorders and joint disorders.

Based on RDC/TMD Axis II, a questionnaire answered by the patients themselves during their first visit to the hospital, assessments were made for graded chronic pain, jaw disability, depression, and non-specific physical symptoms. Each of the index and grade was based on the guidelines of the International RDC/TMD Consortium.

For the comparison of each group's mean indices on the behavioral, psychological, and physical symptoms, one-way ANOVA, Kruskal-Wallis test, and chi-square test were performed. SPSS 12.0KO for Windows (SPSS Inc, Chicago, USA) was used as the analysis program, and the level of significance was set to less than 0.05.

III. Results

Classified into 3 diagnostic subgroups based on the clinical

Table 1. Characteristic pain intensity (n=286)

	Group 1	Group 2	Group 3	Sig.
Characteristic pain intensity	46.15±27.61	37.79±26.17	53.54±26.87	**

Sig.: Significance of one-way ANOVA; ** p<0.01

Table 2. Disability points (n=286)

	Group 1	Group 2	Group 3	Sig.
Disability points	1.77±1.95	1.11±1.61	2.25±2.16	**

Sig.: Significance of Kruskal-Wallis test; ** p<0.01

and radiographic views, Group I had 26 patients (9.1%), Group 2, 228 patients (79.7%), and Group 3, 32 (11.2%). The arthrogenous group was most common.

As a result of the group-based assessments of characteristic pain intensity and disability points of graded chronic pain, Group 3 showed a significantly high value (Table 1~2, p<0.01). Each group's graded chronic pain is shown in Table 3. Compared to Groups 1 and 3, Group 2 showed a relatively low rate in grade 2 or higher (Fig. 1, p<0.01).

With regard to jaw disability, Group 3 showed the most remarkable result. The combined group answered with 5 or more types of functional problems among 12 items including chewing, speaking, and exercising. Groups 1 and 2 recorded 0.29 ± 0.24 and 0.33 ± 0.17 , respectively, in the functional disability index. Unlike other items, Group 2 showed a significantly high index (Table 4, p<0.01).

In terms of the depression index, Group 3 posted the highest value as shown in Table 5 followed by Groups 1 and 2 (p<0.05). Compared to the arthrogenous group, more than half of the patients in the myogenous group and the

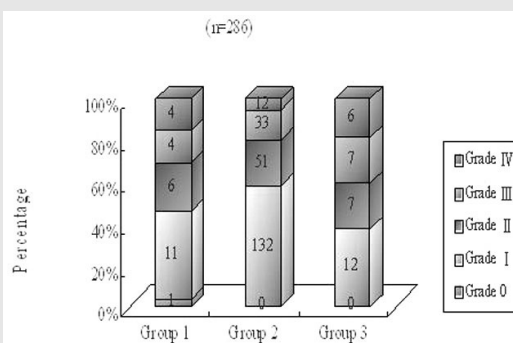


Fig. 1. Graded chronic pain (n=286)

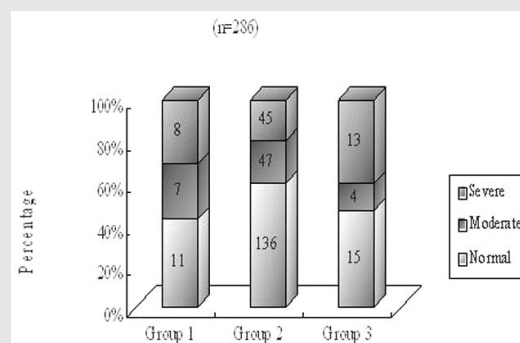


Fig. 2. Depression grade (n=286)

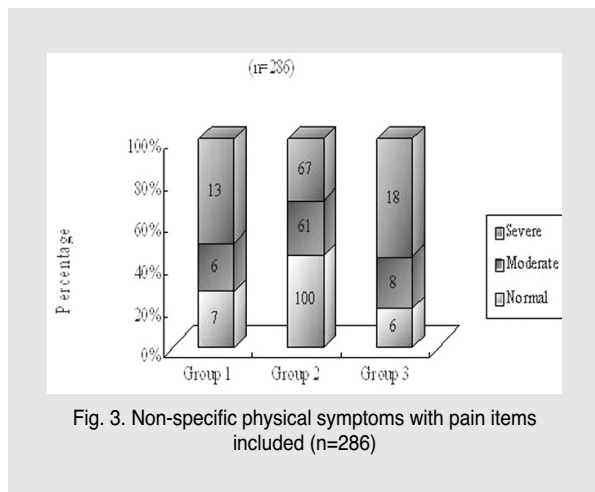


Fig. 3. Non-specific physical symptoms with pain items included (n=286)

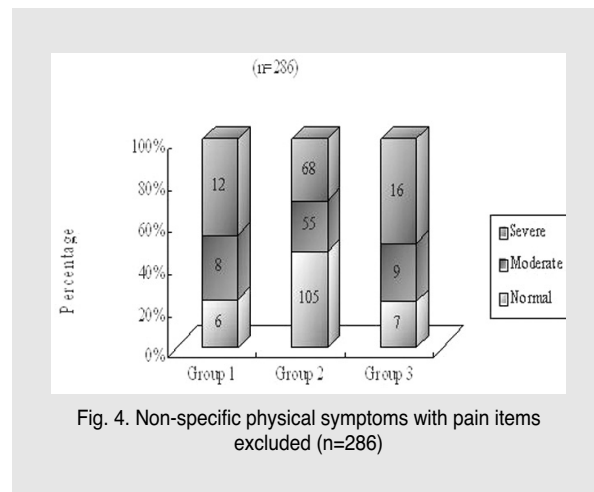


Fig. 4. Non-specific physical symptoms with pain items excluded (n=286)

combined group had mid-grade or higher levels of depression. The relation was not statistically significant, however (Fig. 2, Table 6).

Lastly, as a result of the analysis of non-specific physical symptoms including headache and dizziness, more symptoms were observed in Group 3 followed by Groups 1 and 2 regardless of whether or not pain was included (Table 7, $p < 0.01$). In the analysis including items of pain in the heart region or chest and back pain, Group 2 recorded the highest value in the rate of the normal group (Fig. 3, Table 8, $p < 0.01$). The grade with the pain item excluded showed a similarity to that with the pain item included. The result is shown in Fig. 4 and Table 9 ($p < 0.05$).

IV. Discussion

This study sought to reveal the differences in the behavioral, psychological, and physical symptoms of the diagnostic subgroups of temporomandibular disorders using RDC/TMD. The 286 patients with temporomandibular joint

or masticatory muscular discomfort were divided into 3 groups based on the clinical and radiographic exams: myogenous group (Group 1), arthrogenous group (Group 2), and combined group (Group 3). The RDC/TMD Axis II questionnaire was used to record the graded chronic pain, jaw disability, depression, and non-specific physical symptoms.

As a result of the assessment of characteristic pain intensity and disability based on graded chronic pain, Group 3 recorded a significantly high value (Table 1~2, $p < 0.01$). With regard to the graded chronic pain of each group, however, Group 2 posted a relatively low rate in grade 2 or higher compared to Groups 1 and 3 (Fig. 1, Table 3, $p < 0.01$). This suggests that majority of patients of the myogenous and combined groups had mid-grade or greater pain and psychosocial disorders, whereas more than half of patients of the arthrogenous group experienced low intensity of pain and daily disorders.¹⁶⁾ With regard to this point, Lundeen, et al¹⁵⁾ revealed that the myogenous group

Table 3. Graded chronic pain (n=286)

	Number of subjects			Total
	Group 1	Group 2	Group 3	
Grade 0	1	0	0	1
Grade I	11	132	12	155
Grade II	6	51	7	64
Grade III	4	33	7	44
Grade IV	4	12	6	22
Total	26	228	32	286

chi-square test; $p < 0.01$

Table 4. Jaw disability (n=286)

	Group 1	Group 2	Group 3	Sig.
Jaw disability	0.29±0.24	0.33±0.17	0.43±0.19	**

Sig.: Significance of Kruskal-Wallis test; ** $p < 0.01$

Table 5. Depression (n=286)

	Group 1	Group 2	Group 3	Sig.
Depression	0.83±0.80	0.61±0.67	1.06±0.96	*

Sig.: Significance of Kruskal-Wallis test; * $p < 0.05$

Table 6. Depression grade (n=286)

	Number of subjects			Total
	Group 1	Group 2	Group 3	
Normal	11	136	15	162
Moderate	7	47	4	58
Severe	8	45	13	66
Total	26	228	32	286

chi-square test; Non-significance ($p < 0.05$)

Table 7. Non-specific physical symptoms (n=286)

	Group 1	Group 2	Group 3	Sig.
Pain items included	1.03±0.78	0.75±0.72	1.33±1.07	**
Pain items excluded	0.87±0.73	0.64±0.73	1.20±1.11	**

Sig.: Significance of Kruskal-Wallis test; ** $p < 0.01$

experienced much greater pain than the arthrogenous group. On the other hand, Auerbach, et al¹⁷⁾ found that the disability index related to the myogenous group's pain was higher than the arthrogenous group.

In terms of jaw disability, Group 3 recorded the highest value. The combined group of patients had 5 or more functional disabilities out of a total of 12 items. In the comparison of disability index between Groups 1 and 2, Group 2 showed a significantly high index, unlike other items (Table 4, $p < 0.01$). In other words, the arthrogenous group showed a higher rate of disability in terms of chewing, speaking, and exercising. This can be an important reference for the diagnosis of joint disorders. Since all ailments belonging to the category of temporomandibular disorders may include dull pain and mouth-opening disability during joint-functioning, there may be difficulty in diagnostic judgment. If a clinical approach is used to consider the fact that relatively many patients of the arthrogenous group had problems with yawning,

conversation, and sexual intercourse, however, it will facilitate diagnosis and treatment planning.

RDC/TMD uses 32 items of the Symptom Checklist-90-Revision (SCL-90-R) developed by Derogatis, et al¹⁸⁾ for the assessment of depression and physical disorders. In this study, Group 3 posted the highest value in the depression index followed by Groups 1 and 2 (Table 5, $p < 0.05$). As a result of the analysis of non-specific physical symptoms such as headache and dizziness regardless of whether or not pain was included, more symptoms occurred in Group 3 followed by Groups 1 and 2 (Table 7, $p < 0.01$). This result is consistent with that of many studies, i.e., myogenous disorders characteristically have a connection with psychological pain. For instance, Auerbach, et al¹⁷⁾ revealed that the myogenous group recorded higher values in the depression and stress index compared to the arthrogenous group. Epker and Gatchel¹⁹⁾ pointed out that the myogenous group exhibited more psychological problems. Lindroth, et al²⁰⁾ found that myogenous disorders are closely related to the symptoms of psychological pain and stress.

The fact that the group of myogenous patients recorded relatively high values in depression and non-specific physical symptoms is assumed to be due to several factors. For one, the activated sympathetic nerves will likely react with myalgia²¹⁻²⁴⁾. As the patient's psychologically driven and secondarily attributed factor, this suggests that myogenous disorders may occur. Sternbach, et al²⁵⁾ pointed out that stress excites the sympathetic nerves, causing muscular tension and consistent pain. Franks²⁶⁾ and Kydd²⁷⁾ reported that stress is a direct cause of the increased activation of masticatory muscles. In this context, there are some studies wherein the electromyogram of fascia trigger point was activated further under a stress-causing environment²⁸⁾. In contrast, the chronic pain of masticatory muscles may adversely affect psychology of the patient. In a situation wherein the patient's response capacity is lower,

Table 8. Non-specific physical symptoms with pain items included (n=286)

	Number of subjects			Total
	Group 1	Group 2	Group 3	
Normal	7	100	6	113
Moderate	6	61	8	75
Severe	13	67	18	98
Total	26	228	32	286

chi-square test; $p < 0.01$

Table 9. Non-specific physical symptoms with pain items excluded (n=286)

	Number of subjects			Total
	Group 1	Group 2	Group 3	
Normal	6	105	7	118
Moderate	8	55	9	72
Severe	12	68	16	96
Total	26	228	32	286

chi-square test; $p < 0.05$

pain may persist for a long time; thus changing the psychobiological process²⁹). Moreover, emotional issues such as depression and anxiety disorders make a patient tense. This in turn gives rise to consistently vicious habits including bruxism or tense bites, subsequently producing a vicious cycle of aggravated myogenous disorders³⁰.

This study analyzed the group-based mean indices of graded chronic pain, jaw disability, depression, and non-specific physical symptoms and found that the combined group figured prominently in all items. Compared with the arthrogenous group, the myogenous group posted a significantly high mean index in 3 items excluding jaw disability. This suggests that behavioral, psychological, and physical symptoms are organically related to myogenous disorder, that the behaviorism factor and secondary factor of the patient may cause myalgia, and that his/her psychological condition worsens due to chronic masticatory pain. Accordingly, for the treatment of a patient diagnosed

with myogenous disorder, pain-causing muscles should be identified, and pain-reducing treatment, administered. Efforts should also be made for the control of all afflicting factors and prevention of relapse and vicious cycle.

This study had a few limitations. For one, the sample number of the myogenous and combined groups is insufficient due to the numeric concentration in the myogenous group. Likewise, the control group with no symptoms/signs of temporomandibular disorders was not included in this study. Finally, due to the lack of comprehension of the patients, many items in the questionnaire were left unanswered. To resolve these constraints, further studies are currently being conducted by Bundang Hospital of Seoul National University by considering a broader range of target patients and making revisions to the questionnaire to make it more comprehensive.

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