

Evaluation of Anxiety and Depression in Patients with Disc Displacement according to Diagnostic Criteria for Temporomandibular Disorders

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Purpose: The etiology of temporomandibular disorders (TMDs) is complex and multifactorial including trauma, anatomical, pathophysiological, social and psychological factors. Psychological factors can induce or sustain TMDs in various ways. And psychological problems, such as anxiety and depression can be occurred due to TMDs. Therefore, evaluation of psychological factors in patients with TMDs is important. Although disc displacement (DD) is crucial in clinical situation, most of studies have focused on the relationship of psychosocial factors and myofascial pain. And also, Subtypes of DD can cause different degrees of discomfort, it is necessary to evaluate the psychological states of the patients according to the subtype. The Hospital Anxiety Depression Scale (HADS) is one of the self-report questionnaire to evaluate the psychological factors. HADS-Anxiety (HADS-A) and HADS-Depression (HADS-D) are assessed through 14 questions. The purpose of this study was to evaluate anxiety and depression assessed by HADS in patients diagnosed with subtypes of DD according to diagnostic criteria for TMDs.

Methods: Four hundred thirty nine patients were diagnosed as one of the subtypes of DD. One hundred forty nine subjects with no symptoms were set as control groups. All of them answered the HADS for Koreans. The cut-off score for anxiety and depression was set a score of 8. The chi-square test was performed to evaluate association between DD and anxiety/depression.

Results: There was a significant difference in HADS-D between five groups ($p < 0.01$). However, there was no significant difference in HADS-A. All the DD groups showed a significant difference in HADS-D compared with the control group except the DD without reduction without limited opening group. The DD without reduction with limited opening group showed the highest rates in HADS-D (40.4%).

Conclusions: Based on the above results, it is necessary to consider the depression in treatment of the patients with DDs.

Key Words: Anxiety; Depression; Diagnostic criteria for temporomandibular disorder; Disc displacement; Temporomandibular disorders

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INTRODUCTION

Temporomandibular disorders (TMDs) is known as the most common cause of non-infectious and non-odontogenic orofacial pains. Therefore, all dentists should be aware

of TMDs and offer proper evaluation and treatment based on comprehension of TMDs.¹⁻³⁾ Although etiology of TMDs have not been clearly revealed, it is supposed multifactorial composed of trauma, anatomical, pathophysiological, social, and psychological factors.⁴⁾ Psychological factors can

induce or sustain TMDs by increasing tension of muscles⁵⁾ or decreasing pain threshold.⁶⁾ In addition, psychological problems, such as anxiety and depression may occur due to TMDs.⁷⁾ The evaluation of psychological factors is thus crucial in the treatment of TMDs. However, the evaluation of psychological factors is generally focused on myofascial pain.^{2,4,7)} Subtypes of disc displacement (DD) can cause different degrees of discomfort, including mouth opening limitation which is clinically important.⁷⁾ So it is necessary to evaluate the psychological states of the patients according to the subtype of DD.

In the clinical setting, self-report questionnaire including Symptom Check List-90-Revision (SCL-90-R)⁸⁻¹¹⁾, the Hospital Anxiety Depression Scale (HADS)^{3,12-16)} are usually used to assess psychological factors in patients with TMDs. HADS was developed by Zigmond and Snaith¹⁷⁾ to evaluate anxiety and depression, the most important indicators in psychiatric disorder, within a short time. Oh et al.¹⁸⁾ have standardized HADS for Korean. HADS consists of 14 questions, odd number questions evaluate the anxiety (Hospital Anxiety Depression Scale-Anxiety, HADS-A) and even number questions evaluate the depression (Hospital Anxiety Depression Scale-Depression, HADS-D). Each question consist of four-point (0-3) scale. Total scores of anxiety or depression scale are varied from 0 to 21. The optimal cut-off score for sensitivity and specificity was reported a score of 8 for both HADS-A and HADS-D.²⁶⁾

The Research Diagnostic Criteria for TMDs (RDC/TMDs)¹⁹⁾ was reported in 1992. RDC/TMD was the most commonly used standardized diagnostic criteria for TMDs for about 20 years. After then, DC/TMDs was developed in 2014 as a new standardized diagnostic criteria for TMDs to cover in both clinical and research settings.²⁰⁾ DC/TMD divide DD into four subtypes including DD with reduction, DD with reduction with intermittent lock, DD without reduction with limited opening, and DD without reduction without limited opening.

Most of studies using HADS and standardized diagnostic criteria, such as RDC/TMD or DC/TMD have compared anxiety and depression in myofascial pain, arthralgia, and DD.^{3,12)} Researches evaluating anxiety and depression according to the subtype of DD were rarely reported.

The purpose of this study was to compare anxiety and

depression assessed by HADS between patients diagnosed with the subtype of DD according to DC/TMD and normal controls.

MATERIALS AND METHODS

1. Subjects

1) Patient group

We selected a total of 439 patients diagnosed as one of the subtypes of DD according to DC/TMD among the patients who visited Department of Orofacial Pain and Oral Medicine of Wonkwang University Daejeon Dental Hospital from April 2015 to April 2016. This group was 154 males and 285 females. Their ages ranged from 10 to 82, with average age of 30.71. They were divided into the DD with reduction group (Group 1), the DD with reduction with intermittent lock group (Group 2), the DD without reduction with limited opening group (Group 3), and the DD without reduction without limited opening group (Group 4) according to DC/TMD. In the case of both temporomandibular joints (TMJs) condition being different, they were diagnosed according to the more severe one. This study was approved by the Institutional Review Board of Wonkwang University Daejeon Dental Hospital (IRB no. W1812/003-001) and informed consent was obtained.

2) Control group

A total of 149 people without TMJ sound and no symptoms of TMDs, such as pain or limitation of mouth opening within 30 days were participated in this study as the control group. This group was 75 males and 74 females, ranging in age from 10 to 82 years with an average age of 20.83 years.

2. Methods

Every patients and participant were asked to complete the HADS for Korean by Oh et al.¹⁸⁾ The cut-off score for anxiety and depression was set a score of 8. Score of 0 to 7 were regarded as negative and score of 8 or more were regarded as positive.

3. Statistical Analysis

The chi-square test was used to evaluated the association between DD and anxiety and depression. These statistical

analyses were performed using the IBM SPSS Statistics ver. 23.0 software (IBM Co., Armonk, NY, USA).

RESULTS

1. Composition of DD Patients

Sex distribution of DD patient groups was presented in Table 1. Group 1 was the most common in the patient group and followed by group 2, 3, and 4. Group 3 showed the highest percentage of female and group 1 showed the lowest percentage of female.

Fig. 1 showed age distribution of DD patient groups. Late teens and early twenties were the most common in all patient groups except group 3. In group 3, the thirties were the most common.

2. Comparison of Anxiety and Depression Among DD Groups and the Control Group

In the chi-square test, there was no significant difference

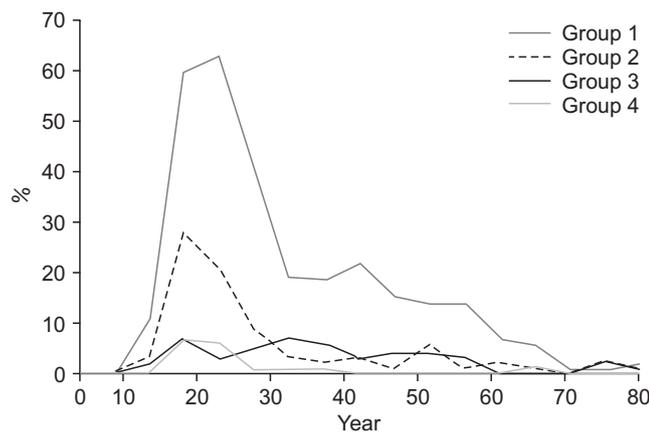


Fig. 1. Age distribution of disc displacement patient groups (5-year increments).

Table 1. Sex distribution of DD patient groups

Group	Male	Female	Total
Group 1	119 (40.3)	176 (59.7)	295 (67.2)
Group 2	23 (28.8)	57 (71.3)	80 (18.2)
Group 3	6 (12.8)	41 (87.2)	47 (10.7)
Group 4	6 (35.3)	11 (64.7)	17 (3.9)
Total	154 (35.1)	285 (64.9)	439 (100.0)

DD, disc displacement.

Values are presented as number (%).

Group 1: DD with reduction. Group 2: DD with reduction with intermittent lock. Group 3: DD without reduction with limited opening. Group 4: DD without reduction without limited opening.

in HADS-A between five groups (Table 2).

While there was a significant difference in HADS-D ($p < 0.01$). Group 3 showed the highest rates in positive of HADS-D as 40.4% (Table 3).

In the chi-square test comparing each DD patient group to the control group, group 1 ($p < 0.001$), 2 ($p < 0.01$), 3 ($p < 0.001$) showed a significant difference in HADS-D, but group 4 showed no significant difference (Table 4).

DISCUSSION

Although DC/TMD was developed, only a few demographic surveys using DC/TMD for TMDs patient were reported. This is the first study investigating sex and age distributions in DD patients diagnosed by DC/TMD in Korea. In this study, DD with reduction was the most common in disc placement patients as 67.2%. In all DD groups, the

Table 2. HADS-A in DD subgroups and control group

Group	Negative	Positive	Total	p-value
Control	114 (76.5)	35 (23.5)	149	0.60
Group 1	211 (71.5)	84 (28.5)	295	
Group 2	63 (78.8)	17 (21.3)	80	
Group 3	33 (70.2)	14 (29.8)	47	
Group 4	13 (76.5)	4 (23.5)	17	

HADS-A, Hospital Anxiety Depression Scale-Anxiety; DD, disc displacement.

Values are presented as number (%).

Group 1: DD with reduction. Group 2: DD with reduction with intermittent lock. Group 3: DD without reduction with limited opening. Group 4: DD without reduction without limited opening.

Data are analyzed with chi-square test.

Table 3. HADS-D in DD subgroups and control group

Group	Negative	Positive	Total	p-value
Control	126 (84.6)	23 (15.4)	149	0.002*
Group 1	200 (67.8)	95 (32.2)	295	
Group 2	55 (68.8)	25 (31.3)	80	
Group 3	28 (59.6)	19 (40.4)	47	
Group 4	13 (76.5)	4 (23.5)	17	

HADS-D, Hospital Anxiety Depression Scale-Depression; DD, disc displacement.

Values are presented as number (%).

Group 1: DD with reduction. Group 2: DD with reduction with intermittent lock. Group 3: DD without reduction with limited opening. Group 4: DD without reduction without limited opening.

Data are analyzed with chi-square test.

* $p < 0.01$.

Table 4. Comparison of depression (HADS-D) between control and each of DD subgroups

Group	Control	
	χ^2	p-value
Group 1	14.26	0.000**
Group 2	7.86	0.005*
Group 3	13.25	0.000**
Group 4	0.73	0.391

HADS-D, Hospital Anxiety Depression Scale-Depression; DD, disc displacement.

Group 1: DD with reduction. Group 2: DD with reduction with intermittent lock. Group 3: DD without reduction with limited opening. Group 4: DD without reduction without limited opening.

Data are analyzed with chi-square test.

* $p < 0.01$, ** $p < 0.001$.

percentage of female was higher than that of male. The DD without reduction with limited opening group which generally have the highest discomfort symptoms presented the highest female percentage as 87.2%, and the DD with reduction group which generally have the lowest discomfort symptoms presented the lowest female percentage 59.7%. This result was similar to previous studies.^{21,22} Some previous demographic surveys of patients with TMDs regarded that TMDs as single unit disease²³ or were assessed without considering the subtype of DD.²⁴ The demographic surveys about subtypes of DD have been rarely reported before. In this study, DD without reduction with limited opening was the most common in the thirties and other subtypes of DD were the most common in teenagers and twenties. These results were similar to the large population study by Goncalves et al.²¹ Goncalves et al.²¹ evaluated prevalence of five symptoms including TMJ sound, pain on TMJ, pain on masticatory muscle, difficulties during mouth opening, and difficulties during lateral deviation. TMJ sound was the most common in the twenties as 26.5% and difficulties during mouth opening was the most common in the thirties as 13.0%. However, difficulties during mouth opening is a subjective symptom and is not always consistent with DD without reduction with limited opening.

The relationship between TMDs and psychological status has been studied for a long time, but clear conclusions have not been drawn yet.³ One of the most important reasons for this is to use the non-standardized diagnostic criteria for TMDs.^{13,14,16} Some studies considered TMDs as a single disorder.^{14,15,25} However, TMDs is not a single problem but a set

of multiple disorders.⁴ Therefore, it is important to distinguish the subtype of TMDs using the latest standardized diagnostic criteria DC/TMD in TMDs studies. One of the other reasons is that various methods have been used to evaluate psychological states. There are SCL-90-R, HADS, etc. as typical self-report evaluation methods that can be used in the clinical setting. SCL-90-R and HADS are widely used self-report questionnaire that are composed of easy questions and can be scored and evaluated by non-experts. SCL-90-R is composed of 90 items, although it can evaluate more various symptom dimensions than HADS which only evaluates depression and anxiety. This results in more time-consuming evaluation and lower agreement and co-ordination of evaluation than HADS. HADS is a validated assessment method that has been used since 1983 to assess depression and anxiety in a variety of patient groups including TMDs.²⁶ Kino et al.¹² and Giannakopoulos et al.³ previously studied the relations between TMDs and psychological states (anxiety and depression) using RDC/TMD and HADS. Kino et al.¹² divided 511 patients with TMDs who visited the hospital with RDC/TMD into four groups of the myofascial pain group, the DD group, the arthralgia group, and the osteoarthritis group and evaluated anxiety and depression using HADS. Kino et al.¹² reported that HADS-D was significantly higher in the myofascial pain group than the DD group. There was no significant difference in HADS-D of the DD group compared to the osteoarthritis group and the arthralgia group. In HADS-A, there was no significant difference among the four patient groups. Giannakopoulos et al.³ assessed HADS in 176 patients who had suffered orofacial pain including TMDs during at least 6 months, 46 normal control group and 152 general population. According to the RDC/TMD, the TMDs patients were divided into the myofascial pain only group, the joint pain only group and the chronic facial pain without TMDs group. In this study, no significant difference in HADS-A was found among groups in both male and female. In HADS-D, there was no significant difference among male groups, but the female myofascial pain only group was significantly higher than the female joint pain only group. Both studies on TMDs patients reported that no significant difference in anxiety was observed and patients with myofascial pain patients were more likely to be associated with depression than those

with joint disease. However, both studies used the average score rather than a cut-off score that was verified during the analysis of HADS to evaluate anxiety and depression and did not distinguish the subtype of DD. This study differed from the previous two studies in that DD subgroups according to DC/TMD was compared with the normal control group and the validated cut-off score of 8 was used in interpreting HADS. This study also focused on DD, which is generally known to be less related to psychological factors.

This study presented HADS-D showed a significant difference, based on the chi-square test, between the five groups (four DD groups and the normal control group). It represented that depression was different between in each subgroup of DD and the normal control group. Previous studies reported that anxiety or depression is more prevalent in TMDs patients with more clinical discomfort.^{13,16)} In the present study, patients who were classified as positive in HAD-D were the most common in the DD without reduction with limited opening group, as 40%. It was regarded that the expression of depression was increased in proportion to the clinical discomforts. Because most of patients with DD with reduction had no specific discomforts, it was expected that DD had less correlation to psychological factors. However, they showed a higher rate of HADS-D positive than the normal control group and the DD without reduction without limited opening group, although the point that the DD with reduction group was restricted to the patients visiting the hospital had to be considered in analysing the results. Most of the patients with DD with reduction had a tendency to visit the hospital if they have pain. Also, patients who were diagnosed as DD with reduction could have additional symptoms like myofascial pain and the present study had limitation that we could not exclude these patients perfectly. In the chi-square test comparing each DD group to the normal control group, the DD with reduction group, the DD with reduction with intermittent lock group, and the DD without reduction with limited opening group showed a significant difference in HADS-D. But the DD without reduction without limited opening group showed no significant difference. DD without reduction without limited opening patients felt relatively fewer discomforts, because they got adapted to the DD state. Therefore, it was regarded that DD without reduction without limited

opening patients got less depression than other DD patients. But, this study had limitations that the pain was not assessed and the number of the DD without reduction without limited opening patients was too small.

Relations between depression and TMDs, especially chronic pain, were reported in the previous studies.^{3,11,12)} The present study was meaningful in that it focused on the DD which had less relations with continuous pain, that was one of the main causes of chronic orofacial pain. This study was able to offer a clue about the correlation between DD and depression. This suggests that depression should be considered in the treatment of DD. Further study designed to include evaluation of the pain in the DD patients or the correlations with items like mouth opening limitation which was directly linked to clinical discomforts will be needed.

In conclusion, this study evaluated anxiety and depression of patients who visited Department of Orofacial Pain and Oral Medicine of Wonkwang University Daejeon Dental Hospital through HADS. And the following results were obtained.

1. There was a significant difference in HADS-D between DD groups and the normal control group, but there was no significant difference in HADS-A.
2. There was no significant difference in HADS-D between the DD without reduction without limited opening group and the normal control group, but the other three DD groups showed a significant difference from the normal control group.
3. The percentage of HADS-D positive was the highest in the DD without reduction with limited opening group.

Based on the above results, it is necessary to consider the patient's depression in the treatment of DD.

CONFLICT OF INTEREST

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

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