

A Comparison Between Masticatory Muscle Pain Patients and Intracapsular Pain Patients on Behavioral and Psychosocial Domains

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Aims: To identify differences between 2 groups of patients with temporomandibular disorders (TMD), those with masticatory muscle pain (MMP) versus intracapsular pain (ICP), and to compare these differences on behavioral and psychosocial domains. **Methods:** There were 435 patients in the MMP group and 139 patients in the ICP group. The overall sample was 88.2% female and had an average age of 36.1 years (SD = 11.7). Patients completed measures of psychological symptoms (SCL-90), pain severity (MPI), sleep (PSQI), activity (MBI), and life stressors (PCL). Heart rate and blood pressure were also measured, and a complete medical/dental history was taken for each patient. **Results:** Results indicated no significant difference in pain severity or duration between the 2 groups ($P > .05$). The ICP group, however, reported fewer affective symptoms of pain than the MMP group ($t = 6.8, P = .01$). The ICP group had twice as many adaptive copers as dysfunctional patients ($\chi^2 = 7.84, P < .01$), while there was no significant difference between these 2 categories for the MMP group ($P > .05$). Finally, the ICP group reported fewer psychological symptoms ($P < .05$), better sleep quality ($F = 7.54, P = .01$), and fewer life stressors ($F = 7.00, P = .01$) than the MMP group.

Conclusion: In contrast to many previous studies, the data set in this study showed no differences in pain severity and duration between the MMP and the ICP groups. Even though pain severity levels were equivalent, the MMP diagnostic group of chronic TMD patients demonstrated more dysfunctional behavioral profiles and significantly higher psychological distress than the ICP subgroup.

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For many years, the etiology of temporomandibular disorders (TMD) was conceptualized within a biomechanical model that focused on somatic disease and structural dysfunction.¹ The majority of TMD patients were seen as representing a relatively homogenous set of physical disorders that could be divided into 2 broad categories that included problems with the temporomandibular joint (TMJ) itself and problems with the muscles of mastication. Because of the frequent overlap of joint-related and muscle-related symptoms, distinguishing between masticatory muscle pain (MMP) and intracapsular pain (ICP) disorders is not always a straightforward task.^{2,3} Recently, several diagnostic taxonomies have been developed to improve clinical decision-making. One of the important features of these recent developments is the

recognition that psychosocial issues may be important to consider along with structural and biomechanical issues in developing an accurate understanding of the etiology and course of orofacial pains.

The importance of psychosocial issues was recently highlighted in the development of the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD).⁴ Dworkin and LeResche recommended that, in addition to the physical diagnosis (Axis I), a psychosocial assessment of TMD patients be codified on Axis II. Axis II involves the psychosocial impact of chronic pain, characteristic pain intensity, and disability attributed to TMD pain.

This emphasis on the importance of psychological issues is reflected in the findings of several recent studies of TMD patients. For example, Carlson et al⁵ found that MMP patients reported greater symptoms of depression, anxiety, fatigue, and sleep dysfunction than a group of normal pain-free individuals. In another study, Korszun et al⁶ examined the comorbidity of depressive disorders with chronic facial pain and TMD, and found that 28% of TMD patients met criteria for the diagnosis of depression.

Interestingly, several authors have reported data indicating that not all TMD are linked to psychological distress. For example, Epker and Gatchel⁷ found that MMP patients showed higher levels of psychological difficulties and displayed more dysfunctional behavior than did ICP patients. Moreover, Dahlstrom et al⁸ used the Multidimensional Pain Inventory (MPI) to evaluate the psychosocial and behavioral parameters associated with chronic pain in subgroups of TMD patients. They found that chronic TMD patients with predominately muscle pain reported more psychological distress than other TMD groups. Overall, these results suggest that MMP patients could be characterized as having more psychological distress than ICP patients.

One inherent weakness of the available literature is that the conclusions regarding the differences between MMP patients and joint pain patients are often confounded by the differences in pain intensity between the 2 groups. For example, several investigators^{9,10} have evaluated biopsychosocial differences and found MMP patients to be not only more dysfunctional, but also to have higher pain intensity scores than ICP patients. Therefore, it is not known whether the characteristics that differentiate these 2 clinical groups reflect the differences due to the more intense nature of the pains they endure, to predisposing psychologi-

cal factors that may have contributed to the onset and exacerbation of pain, or to psychological adaptation to the ongoing pain state. Based on the studies of Epker and Gatchel⁷ and Dahlstrom et al,⁸ it was expected that MMP patients would show more psychological distress than ICP patients. Moreover, we also anticipated that pain levels would be higher and more chronic in the MMP patients, while lower and less prolonged in the ICP patients. Finally, we expected the coping styles to differ between these 2 subgroups with the MMP patients demonstrating more dysfunctional behavior and the ICP patients adopting an adaptive copier profile. The objective of this research was to identify differences between 2 groups of TMD patients, those with MMP versus ICP, and to compare these differences on behavioral and psychosocial domains.

Materials and Methods

Participants

The patients in the study were 574 individuals seen at the Orofacial Pain Center of the University of Kentucky Dental School between December 1996 and August 2000. The patients were between 17 and 83 years of age with a mean age of 36 years (SD = 11.7). The overall sample was 88% female. There was no significant difference in age or gender between the 2 diagnostic groups ($P > .05$).

Procedure

Prior to the initial evaluation, all patients completed an orofacial pain questionnaire that gathered demographic data, historical information regarding their pain, a general medical history, and a battery of psychological questionnaires. The orofacial pain examination began with a detailed history of the patient's chief complaint(s), associated symptoms, TMJ noise, mandibular dysfunction, parafunctional habits, past trauma, previous treatments/consultations for their chief complaint(s), as well as their psychosocial history.

The physical examination included measurement of vital signs (blood pressure and heart rate), cranial nerve examination, balance and coordination tests, and cervical range of movements, and notations were made of any associated pain. Patient evaluation followed the guidelines set forth by the RDC/TMD.⁴ The main components of the RDC/TMD include determinations of painful muscle sites, painful joint palpation, and range of

mandibular opening. The examinations were conducted by dentists with advanced training in the diagnosis of orofacial pain conditions. No formal reliability data were collected, but all examiners were trained in the Orofacial Pain Center of the University of Kentucky within the guidelines of the American Academy of Orofacial Pain.¹

The psychological questionnaires consisted of the Symptom Check List-90 (SCL-90),¹⁴ the Pittsburgh Sleep Quality Index (PSQI),¹⁵ the Multidimensional Pain Inventory (MPI),¹⁶ the Post-traumatic Stress Disorder Check List (PCL),¹⁷ and the Baecke Activity Questionnaire (BAQ).¹⁸ These questionnaires cover a wide range of symptoms and behaviors that are important for the development of a comprehensive treatment/management plan for the patient.

The information obtained from the detailed history and this thorough physical examination provided the basis for a primary diagnosis and a secondary diagnosis. For this study, the primary diagnosis was used to differentiate the MMP group from the ICP group. The sample of 574 consisted of 435 MMP patients and 139 ICP patients.

Physical Measures

The physiological measures of systolic blood pressure and diastolic blood pressure were recorded with a Paramed 9200 automated blood pressure cuff. The cuff was placed on the patient's left arm. Heart rate was measured concurrently with the Paramed 9200 cuff and represented the average beats per minute during the blood pressure recording.

Psychological Measures

The SCL-90¹⁴ assesses current psychological symptom status as measured on 9 dimensions and was given to determine general psychological functioning of the patients. The SCL-90 is a 90-item multidimensional self-report inventory that is scored on a 5-point scale of distress (0 to 4). These dimensions include: somatization, obsessive-compulsive behavior, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. Test-retest reliabilities range from $r = 0.78$ to 0.90 for nonpatient samples, and internal consistencies range from 0.77 to 0.90 .¹⁴

The MPI¹⁶ was used to determine pain severity, as well as provide a pain profile classification of each patient. The MPI pain profile classification is based on pain level, social and physical activities, affective distress, social support, and feelings of

life control. Test-retest reliabilities of the individual scale scores range from $r = 0.68$ to 0.86 , and internal consistencies range from 0.73 to 0.90 .¹⁶ Patients who were classified as either dysfunctional/interpersonally distressed or adaptive copers were included in this study.

The PSQI¹⁵ was used to determine general sleep quality. This instrument gathers information on the number of hours the patient sleeps each night, the number of hours in bed each night, how often the patient is woken up and why, as well as how difficult it is for the patient to return to sleep after awakening. The PSQI has exhibited test-retest stability (full scale $r = 0.85$), good overall internal consistency ($\alpha = 0.83$), and provides a valid and reliable assessment of overall sleep quality and disturbance.^{15,19}

The BAQ¹⁸ was used to determine the level of activity both at work and during leisure time, as well as to obtain information on any exercise routine in which the patients may be involved. The BAQ has exhibited test-retest stability at 3 months (work score $r = 0.88$, leisure score $r = 0.74$, exercise score $r = 0.81$), good overall internal consistency ($\alpha = 0.83$), and has shown good convergent and discriminant validity.²⁰

The PCL¹⁷ is a 17-item measure designed to assess symptoms of post-traumatic-stress disorder (PTSD). Patients are asked to report problems or complaints they may have experienced in the last month in response to a stressful situation. Responses include, but are not limited to, flashbacks, distressing dreams, hypervigilance, impaired concentration, and avoidance behaviors. The PCL has exhibited test-retest stability ($r = 0.96$) and good overall internal consistency ($\alpha = 0.92$), and provides a valid and reliable assessment of the presence of PTSD symptoms.¹⁷

The orofacial pain questionnaire contains qualitative descriptors for self-report representation of the pain experience from the McGill Pain Questionnaire (MPQ).²¹ These characterizations of pain are divided into sensory and affective classifications. The sensory category contained terms such as throbbing, shooting, stabbing, and aching, while the affective category contained terms such as sickening, exhausting, and punishing. The questionnaire also contained sections where the patient was asked about which other specialists were seen for their complaints prior to coming to the Orofacial Pain Center, and what other kinds of treatments (eg, massage, surgery, counseling, or medication[s]) were pursued in the past in an attempt to eliminate their pain.

Table 1 Pain Severity and Duration (Mean and SD) and Analysis of Variance for the 2 Diagnostic Groups

	Intercapsular group (n = 139)	Myalgia group (n = 435)	F	P
Pain severity (SD)	45.2 (11.3)	46.6 (11.9)	1.42	.23
Pain duration in months (SD)	44.2 (65.7)	38.9 (55.1)	.84	.36

Table 2 Multidimensional Pain Inventory Categories

	Intercapsular group (n = 139)	Myalgia group (n = 435)
Adaptive copers	86 (62%)	199 (46%)
Dysfunctional and interpersonally distressed	53 (38%)	236 (54%)

Statistical Analysis

Analysis of variance (ANOVA) was used to analyze separately the differences between the 2 groups on pain severity, affective and sensory pain descriptors, life stressors, and sleep quality. Chi-square tests were used for analyzing group differences on MPI profile classifications and use of alternative treatments. Additionally, differences between the 2 groups on psychological characteristics, as measured by the SCL-90, were tested with ANOVA; family wise error was controlled by adopting a stringent alpha level ($\alpha = 0.01$).

Results

Pain Measures

There was no significant difference ($P > .05$) between the 2 diagnostic groups in pain severity or pain duration. Even though pain severity did not differ between the two groups, the ICP group had a proportionally greater number of adaptive copers as dysfunctional/interpersonally distressed patients in comparison to the proportion of adaptive copers in the MMP group ($\chi^2 = 7.84, P < .01$). These results are presented in Tables 1 and 2. Overall, despite the equivalence of pain duration and severity, data indicate that the MMP group is composed of a significantly larger proportion of dysfunctional and distressed individuals as compared to the ICP group.

Affect and Sensory Pain Descriptors

The descriptive terms used to differentiate between sensory pain experiences and affective pain experiences from the MPQ in the orofacial pain questionnaire were used to determine if there was a significant difference in how the 2 diagnostic groups classified their experience of pain. The sum of the number of affective descriptors and sensory descriptors endorsed by each patient were calculated and a comparison was made between the groups. The MMP group did not endorse more sensory descriptors of their pain experience (mean = 4.25, SD = 1.80) than the ICP group (mean = 4.09, SD = 2.06; $F = 0.792, P = .37$), but the MMP group did endorse more affective descriptors of their pain experience (mean = 1.81, SD = 0.94) than the ICP group (mean = 1.56, SD = 0.87; $F = 6.84, P = .01$). The 2 groups reported similar pain experiences from a sensory perspective, but there was a statistically significant difference between the 2 groups regarding the affective pain experience, with the MMP group indicating more symptoms.

Psychological Characteristics

When patient psychological symptoms were compared, there were statistically significant differences between the MMP and the ICP groups ($P < .01$) on 5 of the 9 dimensions of the SCL-90. These results are presented in Table 3. In every case where there was a difference in self-report of primary symptoms, the ICP group reported fewer symptoms than the MMP group.

Table 3 SCL-90 Symptom Dimensions (Mean and SD) and Analysis of Variance for the 2 Diagnostic Groups

	Intercapsular group (n = 139)	Myalgia group (n = 435)	F	P
Somatization	60.8 (8.7)	64.7 (9.2)	19.2	.00
Obsessive-compulsive	57.5 (11.6)	60.6 (11.9)	7.17	.01
Interpersonal sensitivity	55.09 (11.2)	56.83 (11.7)	2.39	.12
Depression	57.33 (10.4)	60.57 (10.3)	10.31	.00
Anxiety	55.4 (11.3)	58.6 (11.7)	8.046	.01
Hostility	55.6 (9.67)	58.0 (10.3)	6.12	.01
Phobic anxiety	51.0 (10.3)	53.3 (10.9)	4.99	.03
Paranoid ideation	50.9 (10.7)	53.3 (11.2)	5.05	.03
Psychoticism	54.5 (10.3)	56.7 (11.0)	4.42	.04

Sleep Quality

The total score obtained from the PSQI was used to determine if there was a significant difference in overall sleep quality between the 2 diagnostic groups. Analysis of variance revealed that patients in the MMP group reported significantly poorer sleep (mean = 11.1, SD = 4.5) than the ICP group (mean = 9.9, SD = 4.4; $F = 7.54$, $P = .01$). Additionally, the MMP group reported waking up frequently during the night more often ($F = 5.18$, $P = .02$), more use of sleep medication ($F = 6.56$, $P = .01$), and more daytime dysfunction due to poor sleep ($F = 5.61$, $P = .02$) than the ICP group. These statistics indicate the overall insufficient sleep quality of the MMP group compared to the ICP group.

Life Stressors

The total score obtained from the PCL was used to determine if there was a significant difference in PTSD symptoms due to serious life stressors between the 2 diagnostic groups. The MMP group reported experiencing more PTSD symptoms (mean = 38.1, SD = 15.7) than the ICP group (mean = 31.7, SD = 14.9; $F = 7.00$, $P = .01$). While the mean score of neither group was above the cutoff score established by Blanchard et al¹⁷ for a diagnosis of PTSD, the significant difference between the means of the 2 groups indicates more traumatic experiences and more PTSD symptoms for individuals in the MMP group.

Physical Measures

During the initial visit to the Orofacial Pain Center, diastolic blood pressure, systolic blood pressure, and heart rate were taken and recorded. There was no significant difference found between the 2 diagnostic groups for systolic blood pressure (MMP group: mean = 127.7, SD = 18.8; ICP group: mean = 125.1, SD = 19.5) or heart rate (MMP group: mean = 78.6, SD = 11.8; ICP group: mean = 77.8, SD = 10.1). The diastolic blood pressure (MMP group: mean = 73.7, SD = 12.8; ICP group: mean = 71.0, SD = 13.0) did show a marginally significant difference between the 2 groups ($F = 3.92$, $P = .048$).

Alternative Treatments

The orofacial pain questionnaire also included information regarding various types of treatment modalities the patients had employed for symptom relief prior to seeking treatment at the Orofacial Pain Center. Generally, the MMP group pursued more alternative treatments than the ICP group. Specific treatments that the MMP group used significantly more often than the ICP group included medications ($\chi^2 = 6.89$, $P = .01$) and hot/cold applications ($\chi^2 = 6.90$, $P = .01$). There was marginal support for more use of massage therapy ($\chi^2 = 5.84$, $P = .02$), orthodontics ($\chi^2 = 4.46$, $P = .04$), and surprisingly, TMJ surgery ($\chi^2 = 4.57$, $P = .03$) by the MMP group compared to the ICP group.

Discussion

The results of this study revealed that the ICP group had more adaptive copers as compared to dysfunctional and interpersonally distressed individuals than were found in the MMP group. Surprisingly, these 2 groups had equivalent pain intensity as well as pain duration. This finding is inconsistent with the findings of previous investigators.^{9,10} While the MMP group reported more affective symptoms due to their pain than the ICP group, they shared similar pain experience from a sensory perspective. The MMP patients predictably demonstrated more psychological distress, had poorer sleep habits, and related more symptoms due to serious life stressors than the ICP patients. It was interesting to find slightly higher diastolic blood pressure readings among the MMP group, even though systolic pressures and heart rates were similar to the ICP group.

In contrast to studies by McCreary et al⁹ and Rudy et al,¹⁰ we found similar pain levels and duration for the MMP group and ICP group, even though coping skills differed. Those individuals in the MMP group expressed more anxiety and depression than the ICP group and perceived and managed their psychological distress in a more dysfunctional manner. This difference in adaptation of the MMP group to stressful chronic conditions while experiencing similar pain intensity as the ICP group suggests the MMP group differs psychologically and may realize more cognitive problems than the ICP group.

Our data emphasize the potential importance of focusing on cognitive deficits and emotional problems in persons with MMP. This suggests that the MMP patients may be amenable to interventions that include strategies for addressing dysfunctional cognitions. This finding is consistent with Turk et al,³ who demonstrated that patients could reduce their pain by addressing their psychological distress through application of cognitive and physical coping skills. More recently, Carlson et al¹¹ showed that MMP patients responded well to a physical self-regulation protocol that provided sustained pain reduction over a 6-month period of time. Both of these studies, as well as studies conducted by Dworkin et al,¹² suggest that tailored treatment programs can be effective in helping manage MMP.

The authors realize the nature of a retrospective study carries weaknesses inherent to this type of research. One of these weaknesses includes the inability to make statements regarding cause and effect. Additionally, the data used in this study

were obtained from patients who were self-referred for their pain. Because these patients were self-referred, our findings may not generalize to the broader population of individuals with TMD pain who do not report to a pain clinic. In addition, the MMP group represented a substantially larger sample of participants, than in the ICP group. The magnitude of the differences in numbers between the groups may also have contributed to the findings we reported.

Although the number of ICP patients was limited, we believe that the sample size was adequate and probably would not have changed the results if the number of patients in the ICP group was increased. It is also important to note that retrospective research of this type helps to guide in the design and method of prospective studies. Most of the patients in this study had pain of a more chronic nature, and that fact alone emphasizes the importance of evaluating psychosocial factors and psychological distress. Indeed, Parker et al¹³ found that 75% of TMD patients demonstrated significant patterns of psychological problems, strongly suggesting the value of evaluating these domains in the management of TMD.

The results of this study underscore the importance of assessing the psychological distress and behavioral adaptation that is associated with MMP and ICP patients. Our data show that while the pain level and duration are equivalent between these 2 groups, the MMP group was more psychologically distressed and revealed more dysfunctional adaptation than the ICP group. Given the equivalence of the groups on pain-related variables, this study provides ever stronger support for psychological differences between MMP and ICP patients. While it is not possible to determine the origins of the psychological distress with the present design, these data suggest that the pain itself was not necessarily contributing to the psychological distress, but more likely dispositional factors and individual coping resources in response to the pain are major contributing factors.

These results demonstrate the need for longitudinal study of how persons cope with various orofacial conditions. In particular, the psychological dysfunction associated with the MMP patient raises the question of why psychological distress seems so predominant in this group. That question can only be answered with prospective longitudinal research designs. While these designs represent considerable investment, we believe they are crucial to developing our understanding of the etiology of these painful conditions and ultimately the development of successful, long-term management strategies.

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