Differences in Psychosocial Functioning and Sleep Quality Between Idiopathic Continuous Orofacial Neuropathic Pain Patients and Chronic Masticatory Muscle Pain Patients

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Aim: *To examine differences between idiopathic continuous orofacial neuropathic pain (ICONP) patients and chronic masticatory muscle pain (MMP) patients for psychosocial functioning and sleep quality.* ***Methods:*** *Archival data were used to compare 81 ICONP patients to 81 age- and sex-matched chronic MMP patients on pain severity, life interference, life control, and affective distress measures from the Multidimensional Pain Inventory (MPI), a global severity index of psychological symptoms from the Symptom Checklist-90-R (SCL-90-R), Posttraumatic Stress Disorder Checklist–Civilian (PCL-C), and overall sleep quality from the Pittsburgh Sleep Quality Index (PSQI). MANOVA, MANCOVA, and chi-square analysis were used to investigate differences between the two groups in the psychosocial and sleep variables.* ***Results:*** *The ICONP group reported greater pain severity (*P *= .013) and more life interference (*P *= .032) than the MMP group, while the MMP group reported higher levels of global psychological symptoms (*P *= .005) than the ICONP group. After controlling for pain severity, however, the MMP group demonstrated greater affective distress (P = .014) than the ICONP group, and life interference was no longer significantly different between the groups. ICONP patients were more likely to report a traumatic life event (P = .007).* ***Conclusion:*** *Although ICONP patients are likely to present more intense pain and report that their pain causes more interference in their lives, MMP patients are more likely to present with higher levels of overall psychological symptoms. The greater levels of pain severity reported by ICONP patients appear to be partially responsible for their higher levels of reported life interference.* J OROFAC PAIN 2011;25:117–124

Key words: masticatory muscle pain, neuropathic pain, orofacial pain, psychosocial, sleep quality

For many years, pain disorders were diagnosed and treated according to the biomechanical model.[1–3] More recently, researchers and clinicians have appreciated the importance of the psychological aspects in patients who experience chronic pain disorders.[4–6] Chronic facial pain accounts for 40% of all chronic pain problems and is a common cause of disability.[7,8] Temporomandibular disorders (TMD) account for 10% to 15% of all facial pain conditions.[8] Various authors have proposed that the combination of physical, functional, and psychosocial factors characterize TMD,[9–14] and a higher distress level in TMD patients has been reported when compared with controls.[15–17]

Among the psychosocial differences found between pain patients and nonpatients experiencing TMD, depression and anxiety have been the two most notable factors.[18–25] The rates of depression in subjects with chronic pain may vary between 18% to 20%.[26,27] Lindroth et al[28] reported that masticatory muscle pain patients presented more dysfunctional behavioral profiles and more psychological distress than intracapsular pain patients, even though both groups presented similar pain severity and duration. In a recent study comparing psychological aspects among patients with trigeminal neuralgia (TN) and TMD that was based on the Hospital Anxiety Depression (HAD) scale, it was reported that even though patients considered TN more severe than TMD, TN patients and TMD patients had similar scores of anxiety and depression.[29] Although the TN group presented higher daily activity limitations, they seemed to better manage their disease compared to patients with TMD.[29] In summary, psychiatric comorbidity associated with depression and anxiety seems to be a significant factor in orofacial pain conditions, especially in patients with masticatory muscle pain (MMP).[30–32]

The presence of psychological distress has also been suggested to be closely related with sleep disturbances.[33–35] Sleep is necessary to maintain normal physiological functions.[36,37] Sleep disturbances[38] have been investigated in different pain conditions,[33,39–45] and sleep has been reported to be disrupted in TMD patients[46–48] and neuropathic pain patients.[49] Therefore, exploring the nature of sleep disturbance seems fundamental, since it can influence the overall well-being of pain patients.

A thorough understanding of the characteristics and differences among the groups of patients with distinct diagnoses is important to achieve a comprehensive and successful treatment plan for each patient. Even though it could be hypothesized that MMP patients and neuropathic pain patients may present with similar psychological and sleep characteristics, since both disorders are chronic by nature, comparisons between chronic neuropathic patients and chronic MMP patients have not been documented well. If differences are present, learning about those differences may contribute to better treatment and improved outcomes. Therefore, the main objective of this study was to examine differences between idiopathic continuous orofacial neuropathic pain (ICONP) patients and chronic MMP patients for psychosocial functioning and sleep quality.

Materials and Methods

This study was a retrospective chart review and the participants did not have direct contact with study investigators. This study was approved by the University of Kentucky (UK) Institutional Review Board for the Protection of Human Subjects. Informed consent was obtained from all patients during their first visit to the UK College of Dentistry. Data for the proposed study were collected from the dental records of patients who have been evaluated at the UK College of Dentistry's Orofacial Pain Center. Prior to the initial evaluation, all patients completed a set of questionnaires, including aspects related to their orofacial pain, general medical history, and psychological factors. The data obtained from these questionnaires were coded in a database that included the final diagnosis as determined by the treating clinician.

Participants

Patients were selected from the records of the UK College of Dentistry's Orofacial Pain Center based on their diagnoses of ICONP and MMP. The inclusion criteria for ICONP patients were as follows: *(1)* Pain experienced in a region of the orofacial structures with no evidence of any somatic disease; *(2)* pain duration of at least 6 months; *(3)* presence of continuous pain that could fluctuate in intensity and could not be attributed to any other neuropathic pain condition as listed in the American Academy of Orofacial Pain (AAOP) guidelines; *(4)* pain reported as burning; and *(5)* presence of neurologic symptoms such as dysesthesia, hypoesthesia, hyperesthesia, paresthesia, anesthesia, hyperalgesia, or allodynia. These data were determined in two ways. First, the patient had the opportunity to report this to the dentist during the history taking. In addition, the dentist performed a cranial nerve examination using cotton application, pinprick, and sharp/dull discrimination tests to the painful area.

According to the AAOP diagnostic guidelines,[5] neuropathic pain can be divided into two general types: episodic and continuous. The episodic neuropathic pain diagnoses include: TN (International Headache Society [IHS] 13.1; International Classification of Diseases, 9th Revision [ICD-9] 350.1), glossopharyngeal neuralgia (IHS, 13.2.x; ICD-9 352.1), nervus intermedius neuralgia (IHS 13.3; ICD-9 351.9), superior laryngeal neuralgia (IHS 13.4; ICD-9 352.3), herpes zoster (IHS 13.15.1; ICD-9 053.x), and painful ophthalmoplegia (IHS 13.16; ICD-9378.9). The continuous neuropathic pain conditions can be subcategorized into: idio-

pathic continuous neuropathic pain (also called idiopathic [trigeminal] neuropathic pain [ICD-9 350.9] or persistent idiopathic facial pain [IHS 13.18.4]), postherpetic (trigeminal) neuralgia (IHS 13.15.2; ICD-9 053.12), anesthesia dolorosa (IHS 13.18.1), central poststroke pain (IHS 13.18.2; ICD-9 338.0), and complex regional pain syndrome.

Patients who reported intermittent pain, as well as patients who reported electrical shock as being the only quality of their complaint, were excluded from this study. Therefore, episodic neuropathic pain conditions (listed in the AAOP guidelines) were excluded from this study.

Through a careful review of the patient's history, clinical examination, imaging, and patients' records, it was evident that all of the patients reported a history of physical injury at the site of the chronic pain, and none of the patients could be categorized as postherpetic neuralgia, anesthesia dolorosa, central poststroke pain, or complex regional pain syndrome. It should be noted that, in the AAOP guidelines, deafferentation (or posttraumatic) pain is grouped under the category idiopathic continuous neuropathic pain. Therefore, by exclusion, this study population can be subcategorized, according to the AAOP classification,[5] as idiopathic continuous orofacial neuropathic pain (same as persistent idiopathic facial pain [IHS 13.18.4] or idiopathic neuropathic pain [ICD-9 350.9]).

Inclusion criteria for MMP patients included a pain duration of at least 6 months and meeting the Research Diagnostic Criteria (RDC) for myofascial TMD pain.[50] Patients of both groups must have reported pain intensity of at least "3" out of "10" in the numerical rating scale.

The final study sample included 81 ICONP patients and 81 age- and sex-matched MMP patients. The patients were between 23 and 73 years of age (mean: 47.65). The participants were age matched so they were within 2 years of one another. The overall sample was 73% female.

Data Collected and Psychological Measures

Data collected included the following information: age (years), sex, medical diagnosis (muscle pain or neuropathic pain), and duration and severity of orofacial pain symptoms. Data also included results from the following selfreported standardized instruments: Symptom Checklist-90-R (SCL-90-R), Multidimensional Pain Inventory (MPI), Posttraumatic Stress Disorder Checklist–Civilian (PCL-C), and Pittsburgh Sleep Quality Index (PSQI). The above information was needed to describe the study sample and test the study hypotheses.

The SCL-90-R is a 90-item self-reported questionnaire that provides information on the psychological symptoms experienced by the patient. It contains nine symptom dimensions and three global indices of functioning. Subscales of the SCL-90-R measure psychological status, including somatization, obsessive-compulsiveness, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, and paranoid ideation. Three global indices are obtained from these subscales: Global Severity Index (GSI), Positive Symptom Distress Index, and Positive Symptom Total.[51] In this study, the investigators only used the GSI obtained from each patient's questionnaire; the GSI measures the overall psychological distress.

The MPI was constructed specifically for use with chronic pain patients. It consists of a 61-item, self-report measure designed to assess the impact of pain on the individual's life, the patient's perceived responses of others to the patient's pain, and the frequency of patient participation in common daily activities.[52] In this study, the investigators worked with four subscales obtained from the MPI: pain severity, interference, life control, and affective distress.

PCL-C is a 17-item screening instrument for assessing posttraumatic stress disorder (PTSD) in the general population; items are rated on a five-point scale ranging from 1 ("not at all") to 5 ("extremely").[53] The investigators worked with the total PCL-C score obtained from each patient's questionnaire. Patients who did not report any traumatic event were excluded for the purpose of the group's mean calculation. A cutoff score of 41, which is considered to have a clinical significance according to Blanchard et al,[54] was used to determine the presence of PTSD.

The PSQI is used to measure sleep quality and sleep patterns. An individual total score is obtained based on seven characteristics: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, the use of sleep medication, and daytime dysfunction over the last month.[38] The PSQI total score was used to compare both groups for sleep quality.

Statistical Analysis

Multivariate analysis of variance (MANOVA) was used to test differences between the two diagnostic groups on the psychosocial and sleep variables. Three follow-up multivariate analysis of covariance (MANCOVA) models were used to examine differences between the groups after controlling for pain

Table 1 Reported Physical Injury Prior to the Onset of the Continuous Neuropathic Pain

Reported physical injury	No. of patients	%
Endodontic treatment	25	30.9%
Facial trauma	16	19.8%
Extraction	14	17.3%
Endodontic treatment and extraction	9	11.1%
Jaw surgery	4	4.9%
Maxillary sinus surgery	3	3.7%
Intraoral biopsy	2	2.5%
Dental implants	2	2.5%
TMJ surgery	2	2.5%
Endodontic treatment and periodontal surgery	1	1.2%
Apicectomy	1	1.2%
Rhinoplasty	1	1.2%
Periodontal surgery	1	1.2%

Table 2 Psychosocial and Sleep Variable Findings in ICONP and MMP Groups

	ICONP		MMP		
Variables	Mean	SD	Mean	SD	*P*
GSI	58.24	9.59	62.61	10.11	.005*
MPI pain severity	47.85	12.04	42.72	13.84	.013*
MPI interference	39.96	13.21	34.88	16.55	.032*
MPI life control	49.82	8.36	48.96	8.27	.512
MPI affective distress	45.96	9.24	47.43	10.56	.345
PSQI total	9.76	4.81	10.19	4.11	.540

*Indicates statistical significance ($P < .05$).

Table 3 Psychosocial and Sleep Variable Characteristics in ICONP and MMP Groups after Controlling for Pain Duration

	ICONP		MMP		
Variables	Mean	SD	Mean	SD	*P*
GSI	58.24	9.59	62.61	10.11	.007*
MPI pain severity	47.85	12.04	42.72	13.84	.022*
MPI interference	39.96	13.21	34.88	16.55	.046*
MPI life control	49.82	8.36	48.96	8.27	.400
MPI affective distress	45.96	9.24	47.43	10.56	.300
PSQI total	9.76	4.81	10.19	4.11	.547

*Indicates statistical significance ($P < .05$).

duration alone, pain severity alone, and pain duration and pain severity together. Chi-square tests were used to evaluate possible associations between the presence of a traumatic event and the patient's diagnosis, as well as between the presence of PTSD and the patient's diagnosis. Chi-square tests were also used to evaluate possible associations between pertinent nonparametric variables. The criterion for statistical significance was set at $P < .05$. All statistical analyses were completed with the Statistical Package for the Social Sciences, Release 18.0.0 (SPSS, IBM).

Results

The clinical data included a total of 402 patients diagnosed with continuous orofacial neuropathic pain and 1,581 patients diagnosed with MMP. Among the 402 patients who had continuous orofacial neuropathic pain as a diagnosis, 88 fulfilled the inclusion criteria for this study (ICONP group). Among the 88 patients in the ICONP group, 7 patients who had not filled out part of the questionnaires used for this study were excluded. This brought the total number of ICONP patients included in this study to 81. The MMP patients were then selected based on the inclusion criteria described for this group and matched by age and sex with the ICONP group. Among the total patients with MMP, the first 81 who met the inclusion criteria and could be sex- and age-matched with the ICONP group were selected. The mean pain duration was 39.3 months (SD = 60.7) for the ICONP group and 81.0 months (SD = 105.3) for the MMP group. All 81 patients in the ICONP group reported a history of a physical injury in the area of the pain complaint prior to the onset of the continuous neuropathic pain (Table 1).

The ICONP group reported greater pain severity ($P = .013$) and more life interference than the MMP group ($P = .032$), while the MMP group reported higher levels of global psychological symptoms than the ICONP group ($P = .005$) (Table 2). Also, 51.9% (n = 42) of the MMP group and 38.3% (n = 31) of the ICONP patients presented characteristics likely signaling significant psychopathology based on the GSI (GSI's T score above 63).

Table 4 Psychosocial and Sleep Variable Characteristics in ICONP and MMP Groups after Controlling for Pain Severity (Alone) and for Pain Duration and Pain Severity Together

	ICONP		MMP			
Variables	Mean	SD	Mean	SD	$P^{\dagger}$	$P^{\ddagger}$
GSI	58.24	9.59	62.61	10.11	.000*	.000*
MPI interference	39.96	13.21	34.88	16.55	.560	.570
MPI life control	49.82	8.36	48.96	8.27	.101	.079
MPI affective distress	45.96	9.24	47.43	10.56	.014*	.014*
PSQI total score	9.76	4.81	10.19	4.11	.147	.168

*Indicates statistical significance ($P < .05$). †Indicates the P values after correcting for pain severity (alone); ‡indicates the P values after correcting for pain duration and pain severity together.

Table 5 Traumatic Life Events (Experience List) Reported by the ICONP Patients and Pain Onset

Experience list	No. of patients	No. of patients with coincidence between traumatic life event and pain onset
Military combat	1	0
Violent attack	5	1 (facial trauma)
Natural disaster	1	0
Severe auto accident	7	2 (facial trauma)
Being diagnosed with a life-threatening illness	4	0
Sudden injury	6	2 (1 facial trauma, 1 endodontic treatment)
Observed someone hurt or killed	5	0
Learned about a family member or close friend who was hurt or killed	9	0
Other	14	1 (dental extraction)

Parentheses include the type of physical injury reported by the patient(s).

Life control, affective distress, and sleep quality did not differ between the groups (Table 2). Controlling for pain duration did not produce any significant changes on the results mentioned above (Table 3). After controlling for pain severity, however, the MMP group demonstrated greater affective distress than the ICONP group ($P = .014$). In addition, life interference was no longer significantly different between the groups (Table 4). Finally, controlling for pain duration and pain severity together did not result in any significant change from controlling for pain severity alone (Table 4).

Among the patients involved in this study, 64.2% (n = 52) of the ICONP group (mean = 30.1, SD = 15.3) and 43.2% (n = 35) of the MMP group (mean = 36.3, SD = 15.9) reported at least one traumatic life event on the PCL-C questionnaire, and an association between the patients' diagnosis (ICONP) and the probability of a history of a traumatic life event was present ($P = .007$). The PCL-C form includes 15 general categories of possible traumatic life events, including military combat, violent attack, being kidnapped, taken hostage, terrorist attack, torture, natural or man-made disaster, severe auto accident, being diagnosed with a life-threatening illness, sudden injury, observed someone hurt or killed, learned about a family member or close friend who was hurt or killed, learned that your child has a life-threatening illness, and other. Among the 52 ICONP patients who reported a traumatic life event, only 9 out of 15 events were endorsed (Table 5). Of the entire sample, 20 patients had a PCL-C score above or equal to 41, 8 in the ICONP group and 12 in the MMP group. No association was found between the orofacial pain diagnosis and the likelihood of having PTSD ($P = .339$).

Discussion

This study examined the characteristics of ICONP patients and compared them to individuals with chronic MMP. Several studies have focused on sleep and the psychological characteristics of muscle pain patients,[17,33,42] but little has been reported for the same variables in neuropathic pain patients who

experience constant, unremitting pain. Since both groups are chronic orofacial pain populations, clinicians might easily judge these two groups as having similar psychological characteristics and sleep patterns. This assumption, however, may lead to inappropriate treatment approaches since these two groups are distinct from one another on more dimensions than just the quality of their pains. Since the aim of this study was to compare psychosocial and sleep differences of two distinct orofacial pain groups, a control group was not needed. In addition, the questionnaires used in this study are validated questionnaires for which cutoff scores have been established for normal (representing healthy/control individuals) and above normal (eg, elevated scores greater than one standard deviation from the mean representing individuals posing greater psychological concerns) groups.

Several studies have investigated the presence of psychological factors in chronic TMD patients.[11,13,18,28,48] The majority of these studies focused on depression and anxiety. In contrast, this study analyzed broad variables such as the GSI, life interference, life control, and affective distress. Studies conducted by Bertoli et al,[42] Yatani et al,[33] and Schmidt et al[17] also evaluated MMP patients and used parameters similar to those used in this study, and all three studies reported values similar to the scores reported for this study's MMP group. According to this study's findings, the use of more broad variables to analyze differences in chronic pain groups seems to be appropriate since differences among chronic pain groups transcend the already well-documented anxiety and depression that occur in this population.[18–22,24–27] On the subject of the psychosocial variables, this study's results suggest the presence of significant differences between the groups for the GSI, life interference, life control, and the presence of a previous traumatic life event. Therefore, keeping these differences in mind while designing a treatment protocol would be important in order to achieve a positive treatment outcome.

Several previous studies analyzed burning mouth disorder patients,[21–23] who are generally thought to be experiencing a neuropathic pain condition.[4] The study conducted by Carlson et al[23] reported GSI scores and life control and affective distress levels similar to those found for the ICONP group in this study. The study revealed no statistical difference when these three scores were compared with the normal nonclinical sample control, whereas the studies conducted by Zakrzewska[22] and Bergdahl et al[21] showed statistical differences in psychological dysfunction between the control and burning mouth disorder groups. Although the present study showed similar results to the study conducted by Carlson et al,[23] it is important to note that the inclusion criteria for pain duration and pain severity were different between that study and the present study. Therefore, it should not be assumed that the ICONP patients used in this study present similar characteristics to a normal control group. It is important to note that one of every two patients with MMP (51.9%) and one of every three patients with ICONP (38.3%) will present characteristics likely signaling significant psychopathology based on the GSI.

An important aspect that needs to be pointed out is how patients cope with the interference in their lives due to the chronic pain condition experienced by them. The findings of this study suggest that coping is not directly related with the GSI, since the MMP group presented greater GSI scores than the ICONP group, and the ICONP group presented more life interference (based on the MPI) than the MMP group. These findings indicate that clinicians would be well served to probe the coping skills of patients, as that could be a significant area for improvement in functioning.

The mean for the PCL-C score in the MMP group encountered in the present study was similar to the mean reported by Lindroth et al.[28] Although the ICONP group had more patients reporting a traumatic life event than the MMP group, only 15.4% of these were positive for PTSD symptomatology (PCL-C score equal or above 41), whereas 34.3% of those who reported a traumatic life event in the MMP group presented a PCL-C score equal or higher than 41. One possible explanation for this finding can be linked to the higher psychological dysfunction (GSI and affective distress) found in the MMP group. This study could not affirm an association between the diagnosis (ICONP or MMP) and the probability of having PTSD symptoms. However, the results of the study indicated that ICONP patients are more likely to report a history of a traumatic life event, when compared with chronic MMP patients. It is important to note that the traumatic life events reported in the PCL-C questionnaire could be physical or emotional and were not necessarily related to the physical injury to the area of the pain that was reported.

This study did not find any statistical difference between the groups for sleep disturbance. The PSQI scores for the MMP group in this study were very similar to those found in other studies of chronic orofacial pain patients.[28,33,42,48] Thus, this study demonstrated that patients with ICONP, as well as patients with MMP, presented a PSQI total score greater than 5, which is considered to reflect

"poor sleepers," according to Buysse et al.[38] These findings are in agreement with several previous studies reporting sleep disturbances in similar populations.[39,48,49,55] It has been suggested that a link of sleep quality and depression may be an important aspect to recognize and take into account when a treatment plan is developed.[33,39] The results of this study suggest that the sleep disturbance needs to be better investigated since both groups presented mean scores for sleep disturbance (based on the PSQI) compatible with "poor sleepers."

In this study, the groups were matched by age and sex, since these are factors that can influence psychosocial functioning[6,25] and sleep quality.[37] Considering that the severity of pain can also influence the psychosocial functioning[42] and sleep quality,[45] the authors decided to use a MANCOVA analysis that adjusted for pain severity. Life interference, which was significantly worse in the ICONP group, was no longer significant after controlling for pain severity. Instead, the affective distress became significantly worse in the MMP group. This finding showed the positive correlation between pain severity and psychosocial dysfunction. This information is consistent with the literature regarding the necessity of directing the treatment not only for pain, but also for psychosocial dysfunction and sleep.[56]

Study Limitations

The authors found difficulties in comparing this study with previous studies since they selected chronic continuous neuropathic pain instead of episodic neuropathic pain, which includes TN, previously investigated by Castro et al.[29] The variables that did not present significant differences may be linked to lower power due to the small differences between patients in each group. The minimal differences may be due to the strict inclusion criteria for the ICONP group that included the presence of an associated neurologic symptom, such as dysesthesia, hypoesthesia, hyperesthesia, paresthesia, anesthesia, hyperalgesia, or allodynia. However, these inclusion criteria also provided for a clearer diagnosis for the ICONP group. Finally, the authors could not analyze if there were any psychosocial and quality of sleep differences among different subcategories of continuous neuropathic pain since the study population was limited to only idiopathic continuous neuropathic pain. Whether other continuous neuropathic pain conditions have different psychosocial and quality of sleep issues as compared to the ICONP condition remains for future investigation.

Conclusions

Based on the results of this study, it can be concluded that although ICONP patients are likely to present more intense pain and report that their pain causes more interference in their lives, MMP patients are more likely to present with higher levels of overall psychological distress than ICONP patients. The greater levels of pain severity reported by the ICONP patients appear to be partially responsible for their higher levels of reported life interference. The ICONP group is more likely to report a traumatic life event history than the MMP group, although this does not seem to increase their risk of developing PTSD.

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