Pain-Related Limitation in Activities of Daily Living in Patients With Chronic Orofacial Pain: Psychometric Properties of a Disability Index

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Virginia Commonwealth University Medical College of Virginia Richmond, Virginia 23298-0225 Pain-related limitations in activities of daily living are presented for 272 patients reporting orofacial pain of the temporomandibular region using the seven-item Pain Disability Index. Results showed that the factor structure for orofacial pain patients differed little from the factor structure for outpatients visiting chronic pain clinic settings. Analysis of pain diagnostic subgroups showed that patients suffering myogenous complaints had higher scores for four of seven daily-living activities that involved pain-related limitations than patients suffering discal disorders. The factor analytical findings indicated that these patients share common pain-related limitations in activities of daily living. These findings are also consistent with previous results indicating greater pain in orofacial pain patients diagnosed with pain complaints primarily myogenous in origin than in pain patients having discal disorders.

1 OROFACIAL PAIN 1995:9:57-63

uman pain has sensory, affective, and cognitive qualities.¹⁻²
Pain in its chronic form has been characterized as having no clear biologic function indicative of actual or impending tissue damage and as lasting one month beyond the expected course of an acute process.³ It has been defined as a malefic force that often imposes severe emotional, physical, and social stresses on an individual and the individual's family, and it is one of the most costly health problems in society.³

Chronic pain significantly impacts an individual's ability to perform instrumental acts and to carry out behaviors associated with activities of daily living (ADLs). In turn, an individual's awareness that ADLs can accentuate pain results in emotional distress and suffering. A Medline search employing the key words "pain" and "disability" identified 1,027 entries between 1985 and 1994. Of these, 17 involved the oral and temporomandibular region. Fewer of these were concerned with ADLs in such pain patients. One study that did focus on these issues in 30 orofacial pain patients employed a questionnaire for quality of life indicators. Over a treatment period of 6 months, temporomandibular joint (TMJ) pain and associated anxiety proved more sensitive indicators of social dysfunction than perceived functional disorders, such as joint sounds and biting ability.

The degree to which pain interferes with an individual's ability to engage in various life activities has been evaluated with the Pain Disability Index (PDI). The PDI consists of seven items that quantify the interference produced by pain on specific ADLs, and it

measures the patient's perception of disability, not actual physical disability. Studies concerned with the psychometric properties of the PDI, when applied to general medical outpatients and inpatients with chronic pain, have shown it to have internal consistency with good reliability.⁵⁻⁸ According to the authors of the present study, this instrument has not been applied to patients with chronic orofacial pain complaints.

Temporomandibular disorders (TMD) comprise heterogenous musculoskeletal disorders of which orofacial pain is the chief characteristic.⁹⁻¹² Usually, most of the pain arises from the muscles surrounding the TMJ. Pain from the TMJ proper contributes little to discomfort in the temporomandibular region.¹³ Mandibular motions tend to augment the pain.

Painful TMD has been broadly diagnosed as myogenous disorders including myofascial pain dysfunction (MPD) of the masticatory muscles; arthrogenous disorders including arthritides and internal derangements (ID) or abnormal discal disorders of the joint proper^{9,14}; typical trigeminal neuralgia defined as episodic, triggerable, lancinating pain; and atypical trigeminal neuralgia¹⁵ or idiopathic orofacial pain, ¹⁶ an overlap syndrome characterized by both episodic and constant pain. No one has assessed if these diagnostic subgroups differ in terms of the effect of chronic pain on ADLs.

The authors of the present study wanted to see if the factor structure of the PDI in patients with TMD would parallel the findings obtained from patients with other types of chronic pain. 5.6 Since there is no reason for the psychometric properties of the PDI concerned with the impact of pain on ADLs to differ in chronic TMD and other types of chronic pain patients, it was hypothesized that the factor structure would be identical to that obtained in other studies. 5,6 though patients from other referral sources might differ in overall level of pain-related impairment. It was also hypothesized that TMD patients reporting continuous (versus intermittent) pain would report greater pain-related limitations in ADLs than patients reporting less frequent pain and that TMD patients reporting pain from multiple sources would manifest the highest PDI scores. The authors also evaluated the specific items as indicators of pain-related interference in ADLs in relation to diagnosis and compared these results to those published in the literature for other chronic pain populations.

Materials and Methods

The sample consisted of 272 consecutive patients (220 females, 52 males) with signs and symptoms

of orofacial disorder who were admitted to the Virginia Commonwealth University Temporomandibular Joint-Orofacial Pain Center, Richmond, Virginia, because previous treatment had failed. The mean age was 38.9 ± 14.1 SD (range 14 to 89) years. The mean duration of pain was 3.5 ± 5.2 SD years.

As part of an overall assessment, each patient signed a consent form and completed a health questionnaire that included questions about the nature of their pain. They rated items on each scale of the PDI. Ratings were added and averaged to yield a mean PDI rating. The same examiner (FMB) met with patients to explain any uncertainties.

The patients were requested to locate the source of their pain, according to the jaw, head, neck, and teeth. While 92% of the patients localized their pain to the jaw region, many reported secondary pains occurring in the head (59%), neck (50%), and teeth (36%). Patients reporting tooth pain lacked dental decay and complained of minor thermal sensitivity.

Because of the presence of secondary symptoms, more information was requested about the temporal characteristics of these pains. Forty-one percent judged the pain to be continuous, and 24% rated the frequency at least once or more daily. Twenty-two percent reported continuous pain with severe flareups, and 12% reported weekly pain. Eighty-six percent of the patients reported headache: 35% had some form of generalized headache on a daily basis; 35% had a headache at least once weekly; and 16% had headaches infrequently.

Diagnoses were based on a complete history and clinical evaluation, including radiologic analysis, measurement of mandibular limitation on motion, digital palpation of TMJ and masticatory muscles, and recording of joint sounds. Detailed description of these procedures has been published elsewhere. The same examiner (FMB) performed all examinations. The diagnostic criteria used to classify 248 individuals into four distinct subgroups are presented (Table 1). The remaining 24 patients shared overlapping symptoms and signs characterized as combined muscular and joint disorders.

Diagnosis of the 248 patients with clearly definable clinical disorders indicated that 59% suffered from primarily myogenous pain surrounding the TMJ (Table 1). The next most common pain was arthrogenous in nature: 17% had primarily discal disorder (internal derangement = ID) and 4% had osteoarthritis of the TMJ. Approximately 20% of the sample consisted of patients suffering from atypical trigeminal neuralgia or idiopathic facial pain.

Table 1 Diagnostic Criteria for Classification of Pain-Related Subgroups and Numbers of Patients With a Primary Diagnosis

Subgroup*	Inclusion criteria	Exclusion criteria		
Myogenous (n = 146)	Pain within the region of the TMJ or pain in the masticatory muscles on mandibular movement and/or pain of the masticatory muscles on palpation	Radiographic joint pathosis and/or crepitation of joint or evidence of dental disease		
Arthrogenous				
Disk disorder (n = 41)	Clicking/popping and pain in the joint on mandibular movement and/or transient joint locking	Asymptomatic clicking/popping and/or pattern of diffuse masticatory muscular pain on palpation		
Osteoarthritis (n = 10)	Crepitation on joint movement and pain restricted to the joint on mandibular movement and radiographic joint pathosis	Pain diffusely spread in the masticatory muscles and pattern of diffuse masticatory muscular pain on palpation		
Atypical trigeminal neuralgia (n = 51)	Pain localized to the jaw or face	Pronounced pain on palpation of the masticatory muscles and joints on palpation and evidence of dental disease		

^{*}The classification of patients = 88%. The sample size is smaller than the overall sample due to missing data

Results

Scrutiny of the psychometric properties of the PDI in orofacial pain patients confirmed the hypothesis that the factor loadings compared favorably with loadings described heretofore for medical patients with other forms of chronic pain who visited a multidisciplinary pain center (MDPC7) (Table 2). Factor loadings for patients with orofacial pain revealed that a one-factor solution was obtained. accounting for 67.70% of the total variance (eigenvalue = 4.74). All items loaded highly on the singlefactor analysis, with loadings ranging from 0.61 for life support to 0.91 for family/home activities.

A second analysis was done to force a two-factor solution (Varimax) because the findings on patients visiting the MDPC5 suggested a twofactor solution (Table 2). The second factor in the present case consisted of two items, those of social activity and those of life support, which accounted for 10.40% of the total variance (eigenvalue = 0.73). Self-care and life support comprised the second factor in patients who visited the MDPC (Table 2).

The total PDI score, which can range from 0 to 70, was 20.7 ± 18.0 SD for the 272 patients. Fiftyfive patients had a score of 0. The PDI score for

Table 2 Factor Loading for Principal Components Analyses Contrasting Results From an Orofacial Pain Center (ORPC, n = 272) With Those From a Multidisciplinary Pain Center (MDPC)*

	Analysis I		Analysis II (Varimax)			
	ORPC factor	MDPC factor	ORPC factors		MDPC factors	
Variable			1	2	1	2
Family/home	0.91	0.72	0.90	0.21	0.89	0.21
Recreation	0.89	0.61	0.87	0.24	0.80	0.18
Social activity	0.86	0.72	0.69	0.53	0.91	0.20
Occupation	0.89	0.91	0.85	0.30	0.68	0.01
Sexual behavior	0.81	0.82	0.80	0.19	0.90	0.16
Self-care	0.74	0.56	0.71	0.24	0.15	0.91
Life support	0.61	0.62	0.22	0.96	0.06	0.90
Eigenvalues	4.74	3.92	4.74	0.73	3.92	0.90
% variance	67.70	56.00	67.70	10.40	56.00	12.80

^{*}Data from Tait et al.7

the sample was unaffected by gender (F[1,270] = 2.52; P = .11). Mean scores for the subgroups were myogenous disorders, 21.4 ± 16.4 SD; atypical trigeminal neuralgia, 21.7 ± 19.7; arthrogenous/disc disorder, 13.2 ± 17.6; arthrogenous/ osteoarthritis, 14.5 ± 10.1. Scores for the four

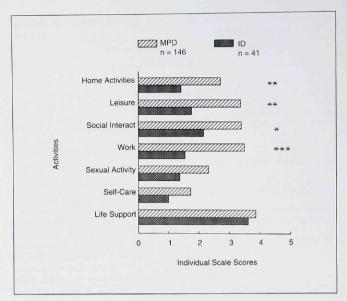


Fig 1 Comparison of PDI scores for patients with myogenous pain (MPD) and patients suffering from pain associated with discal disorders (ID) (*P < .05, **P < .01, ***P < .001).

diagnostic subgroups were statistically different (F[3,247] = 2.87; P = .04).

Further tests conducted on patients suffering pure TMI pain showed those with well-defined myogenous pain differed significantly (F[1,185] = 7.75; P = .006) from patients with pain-related discal disorder (ID) (Fig 1). Patients with myogenous disorders, compared to patients with discal disorders, had higher scores for four of the seven activities: home/family scale (F[1,185] = 7.20; P =.008); leisure scale (F[1,185] = 7.71; P = .004); social scale (F[1,185] = 5.08; P = .02); and work scale (F[1,185] = 13.05; P = .0004). No statistically significant difference was found for sexual behavior (F[1,185] = 3.46; P = .06), self-care (F[1,185] = 2.73; P = .10), or life support (F[1,185] = 0.22; P = .64) between these two groups. The gender of patients did not differ between these two diagnostic categories, chisquare $(\chi^2 = [df = 1] = 2.32; P = .13)$. Because so few patients were diagnosed with osteoarthritis and because the atypical trigeminal neuralgia patients represented possible multiple diagnostic subgroups, further tests were eschewed.

The hypothesis was supported that the greater the number of pain locations reported, the higher

the PDI score (F[4,246] = 8.94; P = .0001). The Duncan post-hoc range test showed that patients with five locations scored higher on disability than patients with three and fewer sites. The score was 30.02 for five sites and 26.2, 20.8, 16.1, and 12.7 for lesser number of sites, respectively. Patients with four sites scored significantly higher than patients with either two or one site, and patients with three sites scored higher than patients with one site.

The hypothesis was confirmed that the temporal qualities of pain influenced the report of disability or impairment. Patients with either continuous orofacial pain or continuous pain with flareup had significantly higher PDI scores (28.6 and 23.4, respectively) than patients with this pain either occasionally (one episode per month), weekly, or once daily (10.1, 16.4, and 11.4, respectively) (F[4,244] = 11.88; P = .0001).

Since information about prior treatments that failed was limited, data concerned with duration were eliminated for patients who suffered pain for less than 1 year. For patients who suffered pain greater than 1 year, the mean duration of impairment was 5.64 years. The chronicity of orofacial pain in these subjects bore no statistically significant relationship to PDI score. r = -.157.

Discussion

The present study showed that the PDI instrument performed similarly in our patients as had been found previously in outpatients suffering other forms of chronic pain. The total mean PDI score of 20.7 for our patients compared favorably with the total mean PDI score of 18.5 for 36 chronic pain outpatients tested at a comprehensive pain treatment center.6 The orofacial pain scores were less by a factor of one half compared with 37 inpatients treated at that center.6 Details were lacking about the source of pain-related limitation in ADLs by both the outpatients and inpatients who visited the treatment center.6 An assumption is that the inpatients suffered more chronic pain than the outpatients or presented with more complicated evaluation or treatment problems that could influence ADLs.

While the PDI is labeled as a disability index, several different definitions exist for the term "disability." The Committee on Pain and Disability of the Institute of Medicine (IOM) has defined it as a disadvantage for a given individual that limits or prevents fulfillment of a role that is normal for the individual, which is termed a "handicap" by the World Health Organization (WHO).17 Disability has been defined by WHO as any restriction or lack of ability to perform activity in a way or within a range considered normal that results from an impairment. This same definition is also termed "functional limitation" by IOM. Finally, disability has been termed an inability to engage in gainful (daily living) activities because of impairment.18 "Impairment" has been defined both by IOM and WHO as any loss or abnormality of psychologic, physiologic, or anatomic structure or function.

The PDI comprises six specific questions concerning limitations in activities of daily living by most active individuals. Question seven is a composite of several basic activities necessary to support life. In the present study, the PDI scores on four of the seven scales were significantly higher in patients with myogenous orofacial pain compared with patients having discal disorder. This finding is consistent with previous results that these groups differ in the same direction in regard to the level of pain report.11 Importantly, the score for life support did not differ between the subgroups. Thus, a more parsimonious interpretation of these scales is in terms of the information provided concerning pain-related limitations in ADLs (PRL-ADLs).

The interactions among pain intensity, painrelated suffering (emotional distress), and PRL-ADLs have been reported to be significantly related to depression, employment status, and medication usage.8 These findings highlight the need for systematic evaluation of the complex interactions of factors which moderate the pain distress-suffering relationship. 19-20

The 55 patients with a PDI score of 0 likely fall into a category which has been designated Axis II. Grade I. The TMD patients categorized Axis II have been subdivided into Grades I and II based on intensity of pain and level of disability.21 Patients belonging to Grade I have low disability and low pain intensity, while patients belonging to Grade II have low disability and high pain intensity. It would be of considerable interest to determine pain intensity in these patients with a PRL-ADL score of 0 as well as specific reasons why the pain was sufficient for seeking a diagnosis and treatment in the face of no impact on daily activities.

The present study found that higher PRL-ADL scores occurred in patients reporting increased numbers of pain locations. Patients reporting one pain site had lower PDI scores than patients with three or more sites. This finding is consistent with previous observations made about patients visiting a Puget Sound, Washington, health maintenance organization.22,23 Nevertheless, limited activity was described as less in that study for TMD pain compared with abdominal, back, chest, and headache pains in another study.22

The temporal effect for headache in the present study has been confirmed in other studies. The range test showed that patients with daily headache or headache at least once weekly had significantly higher PDI scores (27.0 and 21.0) than patients reporting infrequent or no headache (13.9 and 13.4) (F[3,258] = 8.51; P = .0001). In other studies, ratings of pain showed that headache at its worst was more severe than TMJ pain at its worst.4

Endorsement of multiple pain sites in the jaw region was associated with increased PRL-ADLs in our sample. Increased impairment as a function of number of pain complaints parallels the finding that risk of major depression is a function of number of pain complaints in different regions of the body.23 The causal relation among pain sites, pain intensity, pain-related disability, and depression is currently unclear. It is likely that two distinct populations of orofacial pain patients with painrelated disability exist. One group is composed of individuals who might best be considered as reactive depressive due to pain and a second group in which the pain complaint and depression are relatively independent. It would not be surprising to find elevated levels of disability in both groups, but for different reasons.

Impaired function due to pain significantly impacts ADLs concerned with social, psychologic, and self-maintenance activities.24,25 Clearly, TMD patients suffer varying degrees of impairment associated with their disorder. The impairment in PRL-ADLs is reflected in symptom presentation and may relate to objective indexes of illness behavior exhibited by the patient. The possible relationships are poorly understood in subjects with orofacial pain, though an important relationship has been found between levels of muscle tension and overt pain behavior in patients with MPD.26 Patients with high electromyographic (EMG) recordings of masseter muscle activity displayed more guarding and bracing and exhibited greater total pain behavior than patients with low EMG muscle activity. It would be interesting to explore the usefulness of the PDI in relation to behavioral observational techniques, such as guarding and bracing.26 A change in PRL-ADL scores to an unimpaired level (likely approximately 0) after successful treatment of the pain complaint would be good indication that this simple, easily understood instrument has value in clinical outcome evaluations.

Certain limitations must be considered in the present study. The patients presenting to orofacial pain clinics likely represent a biased sample and their disorders may not generalize those of the population at large. The concern about prior treatment failure and chronicity was minimized by the finding of no significant relationship between duration of pain and PDI score. Although the etiology of many orofacial pains is frequently obscure, causing ambiguities in diagnosis, this problem was compensated for by assigning a primary diagnosis to patients with the most dominant symptoms and signs even though they could have been assigned secondary diagnoses. Unknown is the degree to which selfreport of PRL-ADLs is due to physical dysfunction produced by pain in contrast to perceived disability secondary to psychologic factors, such as predisposition to somatization.23

Although the PDI has proved reliable for measuring PRL-related impairment, future research is needed to develop an instrument specific for measuring orofacial PRL impairment. The PDI measurements of patients with oral dysfunction, such as inability to chew, bite, or speak effectively, would be particularly relevant in patients with TMD.

Conclusions

The finding that the PDI factor structure for patients with chronic orofacial pain compared

favorably with the structure found for outpatients suffering from other forms of chronic pain suggests that level of limitation in PRL-ADLs for orofacial pain patients is comparable to previously described levels for pain outpatients in clinical settings.

The PDI appears to be a brief, useful instrument for assessing the impact of orofacial pain and may be quite valuable for assessing treatment outcome and quality of life in pain patient populations. In its present form, the PDI does not differentiate sufficiently between obligatory and voluntary ADLs. Specifically, future studies with this instrument in orofacial pain patients should focus on expanding questions dealing with life support.

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Resumen

Limitación relacionada al dolor en las actividades de la vida diaria de pacientes con dolor orofacial crónico: propiedades psicométricas de un Indice de Incapacidad

Se presentan las limitaciones (relacionadas al dolor) en las actividades de la vida diaria de 272 pacientes que sufrían de dolor orofacial de la región temporomandibular, por medio del uso del Indice de Incapacidad que consta de siete artículos. Los resultados indicaron que la estructura circunstancial de los pacientes con dolor orofacial se diferenció muy poco de la estructura circunstancial de los pacientes de consulta externa que visitaban las clínicas de dolor crónico. El análisis de los subgrupos diagnósticos de dolor demostró que los pacientes que se queiaban de problemas miógenos tenían mayores puntaies en cuatro de siete actividades de la vida diaria que envolvían limitaciones relacionadas al dolor, en comparación a pacientes que sufrían de desórdenes del disco. Los hallazgos analíticos circunstanciales indicaron que estos pacientes comparten limitaciones comunes relacionadas al dolor en actividades de la vida diaria. Estos hallazgos son consistentes también con los resultados previos que indicaban un mayor dolor en pacientes con dolor orofacial, diagnosticados con problemas de dolor de origen fundamentalmente miógeno en comparación a pacientes con dolor que presentaban desórdenes del disco.

Zusammenfassung

Schmerzbedingte Einschränkung von Aktivitäten des täglichen Lebens bei Patienten mit chronischen orofazialen Schmerzen: Psychometrische Eigenschaften eines Schmerzbehinderungsindex

Es werden schmerzbedingte Einschränkungen von Aktivitäten des täglichen Lebens (ADL) bei 272 Patienten mit orofazialen Schmerzen der temporomandibulären Region präsentiert. Es wurde ein Schmerzbehinderungsindex mit 7 Punkten verwendet. Die Resultate zeigten, dass sich der Faktor "Struktur" bei Patienten mit orofazialen Schmerzen wenig vom Faktor "Struktur" bei ambulanten Patienten unterschied, welche eine Klinik für chronische Schmerzen besuchten. Die Analyse von schmerzdiagnostischen Untergruppen zeigte, dass Patienten mit myogenen Beschwerden bei vier von sieben ADL, welche schmerzbedingte Einschränkungen beeinhalteten, höhere Werte erreichten als Patienten mit Diskopathien. Der Faktor "Analytische Ergebnisse" zeigte, dass diese Patienten gemeinsame Einschränkungen von ADL aufweisen. Diese Ergebnisse stimmen mit früheren Resultaten überein, nach welchen Patienten mit orofazialem Schmerz primär myogenen Ursprungs mehr Schmerzen haben als Patienten mit Diskopathien.