The impact of chronic orofacial pain on daily life: the vulnerable patient and disruptive pain

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Objective. To identify patient and pain characteristics associated with negative impacts on daily life among patients with chronic orofacial pain (COFP).

Study Design. Medical records of 200 COFP patients were analyzed.

Results. Diagnostic categories included temporomandibular disorders (85; 42.7%), headaches (47; 23.6%), neuropathic pain (37; 18.5%), trigeminal neuralgia (16; 8.0%), and painful posttraumatic trigeminal neuropathy (PTTN) (14; 7.0%). Of these, 47 (23.7%) had medical and 13 (6.5%) had psychiatric comorbidities and 71 (35.7%) experienced physical trauma. Seven (5%) had stopped working, and mean days absent from work was 3.3 ± 19.3. Patients were previously treated by 2.7 ± 1.4 caregivers. Mean scores on a 0-10 scale were as follows: pain (7.13 ± 2.3), sleep quality (6.6 ± 2.4), and quality of life (5.58 ± 3.1). PTTN patients were more likely to quit work ($P = .009$) and had more days absent from work (mean 24.3; $P = .009$).

We identified patient and pain profiles that predict these poor outcomes. The "vulnerable patient" profile includes health and psychiatric comorbidities and trauma history, particularly PTTN. The "disruptive pain" profile includes severe, continuous, burning, electrical pain accompanied by systemic signs. These profiles intersect in a complex manner, creating a complex feedback loop.

Conclusions. A multidisciplinary team approach is recommended to manage COFP patients, in order to improve treatment outcomes and avert more serious consequences. (Oral Surg Oral Med Oral Pathol Oral Radiol 2017;123:58-66)

Orofacial pain (OFP) includes a heterogeneous group of conditions such as dental, mucosal, musculoskeletal, neurovascular, and neuropathic pain.[1] Epidemiologic studies have shown that up to a quarter of the population report OFP (excluding dental pain), and up to 11% of that is chronic OFP (COFP).[2]

COFP represents a significant burden in terms of morbidity and health service utilization.[3] Pain often interferes with basic orofacial functions such as chewing, speaking, and even tooth brushing.[1] Other negative ramifications include detrimental dietary changes, social isolation, dental neglect with ensuing pathology, physical and psychosocial morbidity, drug abuse,[1] and high levels of health care utilization.[4] The significant disability associated with COFP has a substantial negative impact on general physical function, daily life activities, sleep quality,[5] and quality of life (QoL).[6-8] Together, these can reduce the patient's capacity to work, which affects the functioning of surrounding family members.[1] Treatment of these burdens necessitates a multidisciplinary, holistic team approach, applying the biopsychosocial model of pain management, which addresses not only the pain condition, but also comorbid medical, psychological, and psychosocial conditions, to improve quality of life.[1]

Health-related QoL (HRQoL) is a multidimensional concept encompassing aspects of overall QoL, clearly shown to affect physical and/or emotional health.[9] HRQoL is one of the most important patient-reported outcome measures in evaluations of treatment and health-related interventions.[10]

Assessing sleep quality is also crucial among COFP patients, as sleep is vital to health and poor sleep is associated with adverse health consequences.[5,11] There

Statement of Clinical Relevance

Chronic orofacial pain negatively affects daily life, and specific patient and pain profiles predict a poor outcome. These profiles intersect in a complex manner, creating a complex feedback loop. A multidisciplinary team approach is recommended to manage these complex patients.

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is a bidirectional relationship between poor sleep and pain, where pain leads to sleep difficulties that in turn exacerbate the pain.[5,12]

Clearly determining the burden of COFP-related disability is essential and can provide valuable new insights into the relationships between COFP and its risk factors. The primary objective of the present study was to assess the impact of COFP conditions on normal daily life and to identify patient and pain characteristics that predict poor outcome in terms of impact on daily life. To that end, we measured the number of consultations with clinicians of various specialties and assessed pain characteristics, QoL, sleep quality, and loss of employment attributable to pain in patients with COFP. We further analyzed the association of these variables with specific patient and pain characteristics, in order to identify profiles that predict poor outcome in terms of impact on daily life. These we have termed the "vulnerable patient" and the "disruptive pain" profiles.

PATIENTS AND METHODS

This cross-sectional study retrospectively analyzed the medical records of 200 COFP patients who attended the Orofacial Pain Clinic at Hebrew University−Hadassah between August 1, 2012, and August 1, 2014, and met the inclusion criteria. The study conformed to STROBE guidelines and met the requirements of the Institutional Review Board.

Inclusion and exclusion criteria

Inclusion criteria were ages 18-99 years with primary complaint of COFP present for at least 3 months. Diagnostic categories included temporomandibular disorders diagnosed according to the Diagnostic Criteria for Temporomandibular Disorders.[13] Other COFP was diagnosed according to the International Classification of Headache Disorders, 3rd Edition, beta[14] as follows: Headaches: migraine, tension-type, trigeminal autonomic cephalalgia, and neurovascular orofacial pain (the latter term used for facial pain with migrainous features in the second and/or third division of the trigeminal nerve[2]); trigeminal neuralgia (TN); and painful posttraumatic trigeminal neuropathy (PTTN). Atypical neuropathic pain (NP) included painful trigeminal neuropathy attributed to other disorders, burning mouth syndrome, and persistent idiopathic facial pain.

Exclusion criteria were dental causes for COFP, presence of drug abuse, and pregnancy or lactation. Patients whose history, examination, or imaging revealed a systemic pathologic cause for their pain were excluded from the study. All diagnoses were confirmed in the clinic and then reexamined after data tabulation and summary by both senior authors (RB, YS).

Data collection

Patients were evaluated using a detailed questionnaire followed by a clinical examination. The questionnaire included the following:

1. Demographic details;
2. Chief complaint;
3. Medical and psychiatric comorbidities;
4. Number of medical professionals seen, defined as the number of previous specialist consultations before referral to the OFP clinic, including primary physicians, otolaryngologists, neurologists, rheumatologists, oral and maxillofacial surgeons, dentists, psychiatrists, and alternative therapists;
5. Number of days absent from work and whether the patient stopped working due to pain;
6. History of trauma to the head and/or neck, divided into micro-trauma (e.g., caused by invasive or prolonged dental interventions) and macro-trauma (e.g., falls, road traffic accidents, altercations);
7. History of traumatic life events leading to emotional and psychological trauma (e.g., death of a loved one, divorce, domestic violence, physical or verbal abuse), defined as emotional trauma;
8. Pain severity as assessed on a 0-10 verbal pain scale (VPS) where 0 represents "no pain" and 10 represents "the strongest pain possible";
9. Pain quality as assessed using these descriptive terms: burning, electrical, pressure, throbbing (includes shooting), and stabbing (includes sharp);
10. Accompanying signs including local autonomic signs, such as lacrimation, conjunctival injection, nasal congestion, rhinorrhea, and flushing ptosis/miosis; and systemic signs, such as photophobia, phonophobia, nausea, vomiting;
11. Sleep quality and quality of life over the last month as measured on a 0-10 rating scale, where 0 represents "the worst HRQoL/sleep quality" and 10 represents "the best HRQoL/sleep quality."

All patients underwent a thorough extraoral examination, including the cranial nerves and the masticatory system, as described previously.[1] Intraoral examination was performed to exclude dental, periodontal, and mucosal pathology. Teeth and jaw radiographs were obtained as needed to exclude dental or jaw pathology. Brain and brainstem imaging was routinely performed for TN to exclude intracranial pathology and when indicated if the history and examination suggested a need. For PTTN, depending on the type of injury, appropriate imaging studies

Table I. Distribution of diagnostic categories by demographic, behavioral, and clinical parameters

		TMD		Headaches		NP		TN		PTTN		Total		
Parameter	*Variable*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	P*
Gender	Male	25	29.4	17	36.2	9	24.3	2	12.5	6	42.9	59	29.6	.299
	Female	60	70.6	30	63.8	28	75.7	14	87.5	8	57.1	140	70.4	
Marital status	Married	46	63.0	23	54.8	18	62.1	8	57.1	12	92.3	107	62.2	.186
	Single	27	37.0	19	45.2	11	37.9	6	42.9	1	7.7	64	37.4	
Occupation	Employed	63	90.0	34	82.9	22	78.6	6	54.5	9	81.8	134	83.2	.055
	Unemployed	7	10.0	7	17.1	6	21.4	5	45.5	2	18.2	27	16.8	
Other health comorbidities	Yes	16	18.8	31	67.4	12	32.4	13	81.3	1	7.1	47	23.7	.134
	No	69	81.2	15	32.6	25	67.6	3	18.8	13	92.9	151	76.3	
Psychiatric comorbidities	Yes	5	5.9	1	2.1	4	10.8	1	6.3	2	14.3	13	6.5	.400
	No	80	94.1	46	97.9	33	89.2	15	93.8	12	85.7	186	93.5	
Emotional trauma	Yes	5	5.9	1	2.1	3	8.1	0	0	0	0	9	4.5	.476
	No	80	94.1	46	97.9	34	91.9	16	100	14	100	190	95.5	
Physical trauma	Micro-trauma	13	15.3	6	12.8	14	37.8	4	25.0	12	85.7	49	24.6	**<.001**
	Macro-trauma	11	12.9	4	8.5	4	10.8	1	6.3	2	14.2	22	11.1	
	No trauma	61	71.8	37	78.7	19	51.4	11	68.8	0	0	128	64.3	
Pain wakens from sleep	Yes	24	29.3	15	32.6	9	25.7	8	50	4	28.6	60	31.1	.499
	No	58	70.7	31	67.4	26	74.3	8	50	10	71.4	133	68.9	
Stopped working due to pain	Yes	2	3.2	2	5.3	0	0	0	0	3	27.3	7	5.0	**.009**
	No	60	96.8	36	94.7	20	100	9	100	8	72.7	133	95.5	
Burning pain	Yes	5	6.2	7	14.9	14	38.9	3	18.8	3	21.4	32	16.5	**.001**
	No	76	93.8	40	85.1	22	61.1	13	81.3	11	78.6	162	83.5	
Electrical pain	Yes	7	8.6	3	6.4	2	5.6	10	62.5	3	21.4	25	12.9	**.001**
	No	74	91.4	44	93.6	34	94.4	6	37.5	11	78.5	169	87.1	
Stabbing pain	Yes	16	19.8	10	21.3	5	13.9	9	56.3	5	35.7	45	23.2	**.009**
	No	65	80.2	37	78.7	31	86.1	7	43.8	9	64.3	149	76.8	

	TMD		Headaches		NP		TN		PTTN		Total		
Parameter	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	P†
Age	41.8	16.2	59.2	142.8	53.9	19.8	68.1	15.2	50.1	15.2	50.8	7.9	.555
VPS	6.8	2.18	7.45	1.91	6.77	3.00	8.00	2.03	7.62	2.21	7.10	2.30	.173
No. of previous caregivers	2.58	1.52	2.87	1.39	2.68	1.38	2.56	0.96	2.71	1.27	2.68	1.40	.845
Quality of life	6.18	3.03	5.05	3.22	5.63	3.25	4.71	1.89	4.50	2.97	5.58	3.04	.462
Quality of sleep	6.69	2.01	6.39	2.88	7.11	2.61	6.67	2.74	6.11	3.02	6.63	2.47	.846
Days of absence from work	2.31	15.35	0.54	1.14	2.05	6.93	0.33	1.00	24.30	57.8	3.28	19.25	**.009**

Bold values indicate statistical significance $P < 0.05$.
TMD, temporomandibular disorders; *NP,* neuropathic pain; *TN,* trigeminal neuralgia; *PTTN,* posttraumatic trigeminal neuropathy; *SD,* standard deviation; *VPS,* verbal pain scale.
*Chi-square test.
†Analysis of variance.

were performed to assess the location and extent of injury.

Statistical analysis

Statistical analyses were performed using SPSS software version 21.0. Two-tailed level of statistical significance (α) was set at ≤ 0.05. Continuous variables are presented as means and standard deviations, and categorical variables are presented as frequencies and percentages. Differences between groups were examined with a Pearson chi-square for categorical variables and an analysis of variance for continuous variables. Significance tests between dependent and independent variables included Chi-square test, analysis of variance, and *t* test. Based on the univariate results, significant parameters were selected for multivariate logistic regression (LR) using a stepwise backward model.

RESULTS

Diagnostic categories by demographic characteristics and behavioral and clinical parameters

The final analysis included 199 patients. One patient was excluded due to missing data. The mean age was 50.8 ± 7.9 years. There were 140 female patients (70.4%) and 59 male patients (29.6%). Diagnostic categories included TMD (85; 42.7%), headaches (47; 23.6%), NP (37; 18.5%), TN (16; 8.0%), and PTTN (14; 7.0%).

Table I presents the distribution of the diagnostic categories by demographic, behavioral, and clinical parameters: 23.7% had medical comorbidities, 6.5% had psychiatric comorbidities, 4.5% experienced emotional trauma, and 35.7% experienced physical trauma; of those, 24.6% had micro-trauma and 11.1% had macro-trauma.

Table II. Associations between history of physical trauma and categorical behavioral and clinical parameters

		No trauma		*Micro trauma*		*Macro trauma*		
Parameter	*Variable*	*N*	*%*	*N*	*%*	*N*	*%*	P*
Psychiatric co-morbidities	Yes	125	97.7	42	85.7	19	86.4	.006
	No	3	2.3	7	14.3	3	13.6	
Stopped working due to pain	Yes	2	2.3	2	5.4	3	17.6	.030
	No	84	97.7	35	94.6	14	82.4	
Burning pain	Yes	14	11.2	13	27.7	5	23.8	.023
	No	111	88.8	34	72.3	16	76.2	
Stabbing pain	Yes	23	18.4	13	27.7	9	42.9	.036
	No	102	81.6	34	72.3	12	57.1	
Episodic/continuous pain	Episodic	79	63.2	20	40.8	10	45.5	.049
	Continuous	34	27.2	21	42.9	62	31.6	
	Both	12	9.6	8	16.3	25	12.8	

*Chi-square test.

Table III. Correlations between VPS, sleep quality, quality of life, number of previous caregivers, and number of days absent from work

	VPS		*Sleep quality*		*Quality of life*		*No. of previous caregivers*		*No. of days absent from work*	
Parameters	*Pearson Correlation*	P	*Pearson Correlation*	P	*Pearson Correlation*	P	*Pearson Correlation*	P	*Pearson Correlation*	P
VPS	NR		NS		−0.361	<.001	0.191	.007	0.168	.05
Sleep quality	NS		NR		0.342	.002	−0.188	.04	NS	
Quality of life	−0.361	<.001	0.342	.002	NR		−0.344	.001	−0.324	.006
No. of previous caregivers	0.191	.007	−0.188	.04	−0.344	.001	NR		NS	
No. of days absent from work	0.168	.051	NS		−0.324	.006	NS		NR	

VPS, verbal pain score; *NR,* not relevant; *NS,* not significant.

Patients were treated by approximately 3 previous caregivers and had more than 3 days absent from work. In all, 16.8% were unemployed and 5% reported that they had stopped working due to COFP. PTTN patients presented with more micro-trauma compared to other diagnoses ($P < .001$) and were more likely to quit work due to COFP (27.3%; $P = .009$), and those patients who worked had significantly more days absent (mean: 24.3; $P = .009$).

Pain and patient characteristics

Associations between history of physical trauma and various behavioral and clinical parameters are presented in Table II. Correlations and associations of VPS, sleep quality, QoL, number of previous caregivers, and number of days absent from work are presented in Tables III (continuous parameters) and IV (categorical parameters). Figure 1 presents patient and pain characteristics with significant associations with these parameters in the multivariate analysis.

Physical trauma

Previous physical trauma was positively associated with more psychiatric comorbidities ($P = .006$) and quitting work due to COFP ($P = .03$), and with burning ($P = .023$), stabbing ($P = .036$), and continuous pain ($P = .049$; Table II), severe pain ($P = .045$), and increased days absent from work ($P = .025$; Table IV).

Multivariate linear regression analysis revealed that physical trauma was significantly associated with psychiatric comorbidities ($P = .035$, B [unstandardized regression coefficient] = 0.091, SE [standard error] = 1.13, 95% confidence interval [CI]: 0.010-0.844; Figure 1).

Psychiatric comorbidities

Psychiatric comorbidities were positively associated with QoL ($P = .022$) and higher number of previous caregivers ($P = .036$; Table IV), and with emotional trauma ($P = .001$) and physical trauma ($P = .001$).

Multivariate analysis revealed that psychiatric comorbidities were significantly associated with emotional trauma ($P = .027$, B = 0.045, SE = 1.40, 95% CI: 0.003-0.700; Figure 1).

Pain severity and quality

Higher VPS scores were positively correlated with poorer QoL ($P < .001$) and more previous caregivers ($P = .007$; Table III), and positively associated with physical trauma ($P = .045$), pain-related awakening ($P = .002$), and quitting work ($P = .013$; Table IV).

Table IV. VPS, sleep quality, quality of life, number of previous caregivers, and number of days absent from work according to various behavioral and clinical parameters

		VPS		*Sleep quality*		*Quality of life*		*No. of previous caregivers*		*No. of days absent from work*	
Parameter	*Variables*	*Mean ± SD*	P*	*Mean ± SD*	P*	*Mean ± SD*	P*	*Mean ± SD*	P*	*Mean ± SD*	P*
Presence of health comorbidities other than the OFP	Yes		NS	5.5 ± 2.4	.017	5.9 ± 3.1	.016		NS		NS
	No			6.9 ± 2.4		4.4 ± 2.7					
Psychiatric co-morbidities	Yes		NS		NS	2.6 ± 1.7	.022	3.46 ± 1.3	.036		NS
	No					5.78 ± 3.0		2.62 ± 1.4			
Physical trauma	Yes	7.5 ± 2.1	.045		NS		NS		NS	8.1 ± 31.1	.025
	No	6.9 ± 2.4								0.4 ± 1.2	
Pain wakes from sleep	Yes	7.9 ± 1.9	.002	5.6 ± 2.3	.001		NS		NS		NS
	No	6.8 ± 2.4		7.2 ± 2.3							
Stopped working due to pain	Yes	9.1 ± 1.6	.013	4.2 ± 0.8	.03	2.0 ± 2.4	.008		NS		NR
	No	6.9 ± 2.3		6.5 ± 2.3		6.1 ± 2.9					
Episodic versus continuous†	Episodic		NS		NS	6.4 ± 2.7	.018		NS	0.3 ± 0.8	.013
	Continuous					4.5 ± 3.1				11.3 ± 36.5	
	Both					5.2 ± 3.2				0.37 ± 0.9	
Systemic signs	Yes		NS	5.9 ± 2.3	.024		NS	2.6 ± 1.4	.061		NS
	No			7.0 ± 2.5				2.9 ± 1.3			
Autonomic signs	Yes		NS		NS		NS		NS	13.4 ± 43.0	.004
	No									1.13 ± 6.3	
Burning pain	Yes		NR		NS	3.9 ± 3.1	.003	3.2 ± 1.0	.016		NS
	No					6.1 ± 2.9		2.6 ± 1.4			
Electrical pain	Yes		NR	5.6 ± 2.0	.046		NS		NS	10.6 ± 42.3	.025
	No			6.8 ± 2.5						1.2 ± 6.3	

VPS, verbal pain score; *SD,* standard deviation; *OFP,* orofacial pain; *NS,* not significant; *NR,* not relevant.
*Independent *t* test.
†Analysis of variance.

Multivariate analysis revealed that VPS was significantly associated with QoL ($P = .02$, B = −0.219, SE = 0.091, β = −0.296, 95% CI: −0.401 to −0.038). To avoid overadjustment and reveal factors other than QoL influencing the VPS outcome, we performed another multivariate analysis, with all parameters except QoL having significant association with the VPS score. This analysis revealed that VPS was significantly associated with number of previous caregivers ($P = .026$, B = 0.318, SE = 0.141, β = 0.187, 95% CI: 0.039-0.597) and physical trauma ($P = .01$, B = 0.729, SE = 0.278, β = 0.221, 95% CI: 0.179-1.28; Figure 1). Burning pain was positively associated with NP and PTTN diagnoses ($P = .001$; Table I), physical trauma ($P = .023$; Table II), poorer QoL ($P = .003$), and more previous caregivers ($P = .016$; Table IV).

Multivariate analysis revealed that burning pain was significantly associated with physical trauma ($P = .007$, B = 0.226, SE = 0.556, 95% CI: 0.076-0.672; Figure 1).

Sleep quality

Poor sleep quality was positively correlated with poorer QoL ($P = .002$) and higher number of previous caregivers ($P = .04$; Table III), and was positively associated with health comorbidities ($P = .017$), pain-related awakening ($P = .001$), quitting work due to pain ($P = .03$), systemic signs ($P = .024$), and electrical pain ($P = .046$; Table IV).

Multivariate analysis revealed that sleep quality was significantly associated with electrical pain ($P = .036$, B = −1.593, SE = 0.740, β = −0.261, 95% CI: −3.076 to −0.110) and systemic signs ($P = .022$, B = −0.358, SE = 0.152, β = −0.280, 95% CI: −0.663 to −0.054; Figure 1).

Quality of life

Poor QoL was positively correlated with higher VPS ($P < .001$), poorer sleep quality ($P = .002$), higher number of previous caregivers ($P = .001$), and more days absent from work ($P = .006$; Table III). Poor QoL was positively associated with health comorbidities ($P = .016$), psychiatric comorbidities ($P = .022$), quitting work due to pain ($P = .008$), continuous pain ($P = .018$), and burning pain ($P = .003$; Table IV).

Multivariate analysis revealed that QoL was significantly associated with health comorbidities ($P = .047$, B = −1.748, SE = 0.845, β = −0.260, 95% CI: −3.469 to −0.028), psychiatric comorbidities ($P = .004$, B = −7.807, SE = 2.513, β = −0.413, 95% CI: −12.927 to −2.688), and sleep quality ($P = .017$, B = 0.451, SE = 0.180, β = 0.350, 95% CI: 0.084-0.817; Figure 1).

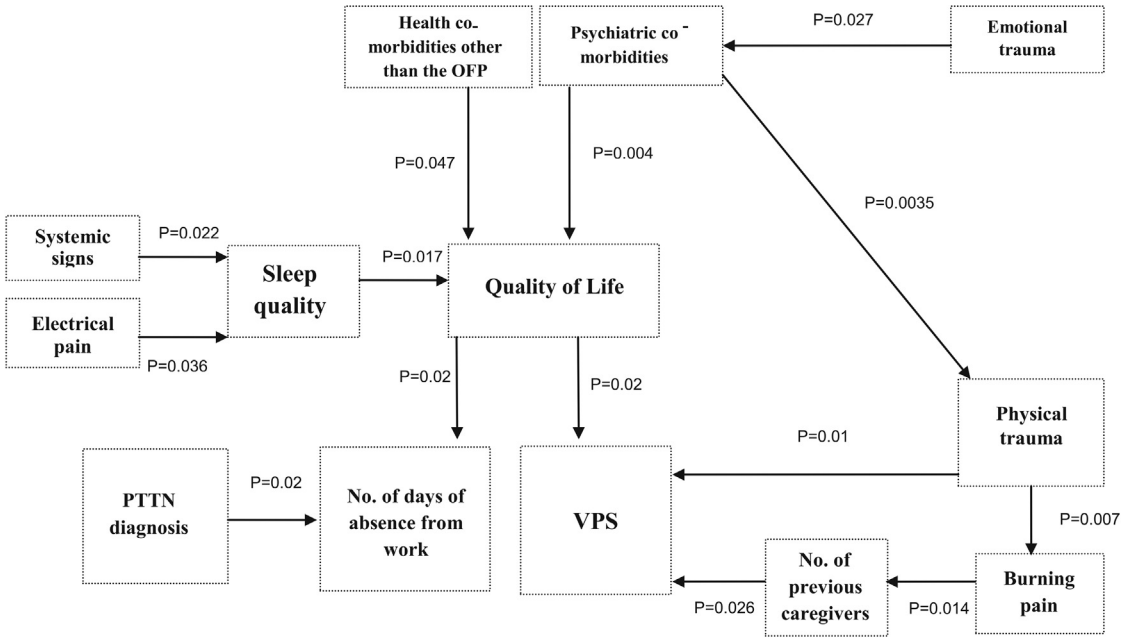

Fig. 1. The complex feedback loop of patients with chronic orofacial pain (COFP) according to multivariate analysis.

Number of previous caregivers

Treatment by more caregivers was positively correlated with higher VPS ($P = .007$), poorer sleep quality ($P = .04$), and QoL ($P = .001$; Table III) and was positively associated with psychiatric comorbidities ($P = .036$) and burning pain ($P = .016$; Table IV).

Multivariate analysis revealed that number of previous caregivers was significantly associated with burning pain ($P = .014$, B = 1.033, SE = 0.409, $\beta = 0.327$, 95% CI: 0.216-1.851; Figure 1).

Number of days absent from work

More days absent from work was positively correlated with higher VPS ($P = .05$) and poorer QoL ($P = .006$; Table III) and was positively associated with physical trauma ($P = .025$), continuous pain ($P = .013$), autonomic signs ($P = .004$), electrical pain ($P = .025$; Table IV), and PTTN diagnosis ($P = .009$; Table I).

Multivariate analysis revealed that the number of days absent from work was significantly associated with PTTN diagnosis ($P = .021$, B = 4.992, SE = 2.092, $\beta = 0.296$, 95% CI: 0.790-9.193) and poorer QoL ($P = .022$, B = −2.852, SE = 1.203, $\beta = -0.336$, 95% CI: −5.269 to −0.435; Figure 1).

DISCUSSION

The findings of the present study indicate the considerable impact of COFP on normal daily activities, such as pain-related disability, QoL and sleep, loss of employment attributable to pain, and health care–seeking patterns. We identified specific patient and pain characteristics that predict poor outcome in terms of impact on daily life (Figure 1).

Specific patient characteristics establish a profile of the "vulnerable patient" and include the presence of health and psychiatric comorbidities and a history of trauma, in particular associated with a diagnosis of PTTN.

Specific pain characteristics form the profile of "disruptive pain" and include severe, continuous pain of burning or electrical quality accompanied by systemic signs (Figure 1). Neuropathic pain, including PTTN, is characterized by severe pain of burning, electrical, or stabbing quality,[1] which are also the characteristics of disruptive pain. The "vulnerable patient" and "disruptive pain" profiles match in many ways, which does seem logical. The various clinical and behavioral parameters that define these profiles intersect in a complex network of connections, creating a complex feedback loop (Figure 1). These could be combined into a descriptive profile such as "disruptive pain and the vulnerable patient."

The "vulnerable patient"

Demographic parameters. All diagnostic categories were more prevalent among women, in line with previous reports.[1] No significant differences were found between the diagnostic categories regarding demographic characteristics; moreover, the impact of COFP on everyday function was not attributable to any demographic parameter.

Health and psychiatric comorbidities. Health comorbidities were negatively associated with sleep quality in the univariate analysis, and both health and psychiatric comorbidities had a significant negative association with QoL in the multivariate analysis (Figure 1). Indeed, the impact of health and psychiatric comorbidities on QoL is well known,[15] and sleep disorders are highly prevalent in diverse chronic medical disorders.[16] Our findings are in line with other reports showing that COFP and QoL are negatively associated.[17] Previous emotional trauma combined with the COFP experience, particularly the disability that accompanies posttraumatic pain, may have a profound psychological impact. Therefore, all COFP patients should receive therapy for comorbid medical and/or psychiatric illnesses that may precipitate or exacerbate COFP.[18]

Physical trauma and PTTN diagnosis. The impact of physical trauma is remarkable: It is associated with stronger burning, stabbing, and continuous pain, more psychiatric comorbidities, and quitting work due to COFP. Moreover, employed patients had significantly more days absent from work (Tables II and IV). The latter two associations were noted in particular among PTTN patients (Table I). Because these factors associated with physical trauma are common to the "vulnerable patient" and "disruptive pain" profiles, it seems that physical trauma plays a key role in the development of these profiles.

The most profound effect of PTTN diagnosis was on the number of days absent from work (24.3), which was more than 7 times higher than the average number of days lost in our COFP population (3.28; Table I). Moreover, 27.3% of PTTN patients stopped working due to pain, which is more than 5 times higher than the proportion of patients who quit work among our COFP population (5%), and also higher compared to previous reports demonstrating that 17% of COFP patients had to take time off work.[19] These data emphasize the loss of productivity of PTTN patients and increased health care costs.

Surprisingly, the number of days absent from work was not related to health care−seeking patterns. In other words, loss of employment was not due to the patient's attending medical consultations, but to physical trauma, poorer QoL, and specific pain characteristics such as severe, continuous electrical pain and autonomic signs (Table III), and particularly to PTTN diagnosis, as discussed above (Figure 1).

Interestingly, 80% of PTTN patients in the present study suffered from micro-trauma, and the majority of patients (69%) who experienced physical trauma also had micro-trauma (Table I). This highlights the fact that devastating consequences can arise from micro-trauma caused by routine dental procedures, not just macro-trauma. Although a minority of patients (3-5%) with minor injury to the trigeminal nerve developed chronic pain,[20] the consequences among those who develop persistent COFP may be severe and disproportionate to the initiating trauma.[21] Clinicians should be aware of these consequences, especially in light of the increased frequency of invasive dental procedures in recent years, such as dental implants, periodontal surgery, and endodontic therapy including surgical endodontics.

The results of the present study expand on previous evidence of the recalcitrant nature of PTTN, particularly in regard to standard pharmacotherapy.[22] PTTN is associated with a substantial psychosocial burden,[23] pain catastrophizing, reduced QoL, and poorer coping efficacy levels.[21] Indeed, neuropathic pain has been shown to lead to chronic disability in addition to weight loss, insomnia, and reduced function.[24]

"Disruptive pain"

Pain severity, quality, and accompanying signs. The "disruptive pain" profile highlights the need for careful anamnesis, not only assessing pain severity in terms of VPS, but also pain quality and accompanying signs.

According to our analysis, burning pain is associated with physical trauma history and contributes to repeated medical consultations and pain exacerbation (Figure 1).

Moreover, electrical pain and systemic signs were significantly associated with sleep quality, which contributes to poorer QoL and pain exacerbation (Figure 1).

These associations lend some support to the concept of a vicious cycle and pain catastrophizing (Figure 1). It is possible that the persistent expression of helplessness and catastrophizing of COFP patients results from years of suffering from a debilitating condition.

Sleep disturbance is a hallmark of neurovascular pain[25]; however, few studies describe sleep quality in PTTN, TN, and neuropathic pain.[26-28] Our findings show that the well-known association between sleep and pain[29] is present in all COFP diagnoses, without significant differences between entities (Table I). Moreover, sleep quality was associated with electrical pain, which characterizes neuropathic pain and TN, and with systemic signs, which usually accompany neurovascular pain.

We found that the mean number of previous consultations was approximately three, which is in line with three consulting specialties and less than the mean of seven consultations across all care settings for the patients in a UK study.[30] In our study, we counted the number of specialists consulted, not the number of appointments, therefore our results are in line with the UK study.[30]

The fact that burning pain was the most significant parameter associated with higher health care utilization

is not surprising, considering that burning pain was associated with physical trauma, which was associated with psychiatric comorbidities and emotional trauma (Figure 1). Multiple referrals associated with this complex condition could be a reason for repeated investigations.[30] Moreover, catastrophizing was also found to be associated with multiple caregiver visits.[31]

Limitations of this study include the possibility of selection bias in this convenience cohort. However, patients were referred from multiple clinics serving different populations. Patients with more severe or intractable pain go to hospital clinics, and therefore the cohort is not representative of all COFP cases. The retrospective study design means that we cannot assume causality, and therefore this paper only suggests associations between the variables. Data were self-reported and not verifiable. Subjective measures are prone to overestimation, especially considering that the complaints were reported retrospectively. Future studies should address these underlying factors regarding this complex issue.

CONCLUSIONS

Normal daily activities are considerably impaired in COFP patients, and specific patient and pain profiles predict poor outcome. Clinicians and health authorities should be familiar with the "vulnerable patient" and "disruptive pain" profiles. The interactions between the various clinical and behavioral parameters of these profiles create a complex feedback loop. Therefore, a multidisciplinary, holistic team approach, working according to the biopsychosocial model of pain management, addressing the complexity of these patients is recommended to improve treatment outcome and avert more serious consequences. It is important to emphasize that clinicians should address not only the pain condition, but also comorbid medical, psychological, and psychosocial conditions, and therefore both nonpharmacologic and pharmacologic modalities are required to restore QoL in these individuals.

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