

Chronic orofacial pain is associated with psychological morbidity and negative personality changes: A comparison to the general population

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Abstract

Background: Chronic orofacial pain is a biopsychosocial problem. Pain description and intensity have been previously reported by the authors. This follow up study reports on the presence and severity of psychological morbidity and personality changes associated with chronic orofacial pain.

Methods: A total of 415 questionnaires for psychological morbidity (238 chronic orofacial pain patients and 175 controls) and 205 responses for personality changes (105 pain patients and 100 controls) were analyzed. Demographic and socioeconomic data included sex, age, marital status, level of education and current work status. Psychological variables tested were depression, anger, fear, distress, frustration and anxiety. Pain patients indicated descriptors of their personalities 'pre-pain' and 'with pain'.

Results: The chronic pain group reported higher levels of 'feeling sad or miserable' $p < 0.001$ 'feeling frustrated' $p = 0.001$ and 'feeling anxious, worried' $p = 0.022$ than the control group. Within the chronic pain group, patients unemployed due to pain or other reasons reported higher levels of 'feeling sad or miserable' and 'feeling frustrated' ($p < 0.05$) compared with patients engaged in full or part-time work. Negative personality changes due to pain were clearly evident with 'irritable' and 'sad' being frequently chosen words ($p < 0.001$).

Conclusions: Patients with chronic orofacial pain suffer from negative psychological and personality changes.

Key words: Orofacial pain, psychological factors, personality, depression, anxiety.

Abbreviations and acronyms: BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory; DASS = Depression, Anxiety, Stress Scales; IASP = International Association for the Study of Pain; MMPI = Minnesota Multiphasic Pain Inventory; MPQ = McGill Pain Questionnaire.

(Accepted for publication 17 September 2004.)

INTRODUCTION

Pain is a frequently reported complaint by patients attending their dental practitioners. Pain can occur as a presenting symptom or as a post-operative result of dental treatment. Within the daily scope of patients seeking treatment at a dental surgery, acute pain is the presenting symptom for several conditions such as pulpitis, pericoronitis and acute abscess. In this context, pain is assessed as a sensory phenomenon and, accordingly, treatment primarily involves prescribing pharmaceutical drugs such as opioids, non-opioids (paracetamol) and non-steroidal anti-inflammatory medications. Pain words chosen by patients to explain this (sensory) pain may include 'sharp, throbbing, burning, aching'.¹

However, pain is defined as both a sensory and an emotional experience by the International Association for the Study of Pain (IASP).² Tissue injury causes nociception that subsequently activates the CNS centres of the prefrontal cortex and anterior cingulate regions which are involved in the emotional/affective aspects of the pain experience. Functional magnetic resonance imaging of the brain has revealed increased blood flow to these centres in both acute experimental pain and chronic pain.³ Clinically, the patient demonstrating the affective component of pain may claim 'it hurts' and 'I am suffering with pain'. Pain words selected may include pain that is 'agonising, suffocating, terrifying and cruel'. These pain word descriptors are increasingly used in the chronic pain state and demonstrate the onset of psychological co-morbidities of fear, anxiety, depression, despair, panic and frustration. Treating depression in these patients improves both patient outcomes and reduces pain intensity.⁴ Conversely, persistent uncontrolled pain creates a vicious cycle of depression and increased pain. This has led to the establishment of our current conceptual framework that chronic orofacial pain is a biopsychosocial problem.⁵ Factors that may influence the onset, degree and subsequent cascade of psychological changes in chronic pain include the current work status of the individual.⁶

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In patients with persistent orofacial pain from diagnostic states such as temporomandibular disorder and neuropathic pain, pain word descriptors in the Australian population have been previously reported by the authors.⁷ Pain qualities (cruel, terrifying) are initially useful in alerting the dental practitioner to the likely presence of psychological changes. However, more specific questions should then be asked by the practitioner. Information identifying forms of negative psychological changes and the extent or severity of these variables has not been reported in the Australian chronic orofacial pain population.

The first aim of this study was to assess several key psychological variables: depression – ‘feeling sad or miserable’; anger – ‘feeling irritable or angry’; fear – ‘feeling tense or panicky’; distress – ‘distressing thoughts that come to you’; frustration – ‘feeling frustrated’; and anxiety – ‘feeling anxious, worried’.

‘Feelings and thoughts’ are ubiquitous in all people and thus a large (healthy/non-pain) control group was included in the study in order that correct statistical analyses be undertaken. Measuring the intensity and presence of these psychological variables in the general population was considered essential to identify the true changes that occur in patients with chronic orofacial pain.

The type of personality prior to the onset of persistent pain (pre-pain) and personality changes due to pain (with pain) of patients has been the subject of continuing discussion in the literature. Initially, published information in this area was largely anecdotal and found in textbooks. Afflicted sufferers, for example, were described as ‘pain-prone individuals’ based on the psychoanalytical model of pain.⁸ This material lacked control data to identify statistical differences in personality description of these pain-prone patients at the pre-pain stage and with pain. In particular, there has been a paucity of research to date in subjects with orofacial pain assessing the nature of personality change. The second aim of this study was to develop a preliminary screening instrument for chronic orofacial pain patients to examine this issue. An extensive list of personality word descriptors was drawn up for completion by the pain group and a control group to determine if this research direction into personality differences was valid for orofacial pain and whether it was subsequently useful for clinical dental practice.

METHODS

Patients with chronic orofacial pain referred to the authors’ institution completed a pain questionnaire that included details of sex, age, marital status, level of education, current work status, pain intensity and duration of pain. The diagnoses were made following individual patient clinical assessments by the authors who have worked in multidisciplinary pain clinics treating chronic orofacial pain (ERV 17 years, HB six years, respectively). Diagnoses were based on the

Table 1. Comparison of demographic and socioeconomic variables between the pain group, control group and general population

Variable	Pain group (n=238)	Control group (n=175)	General population*
Male:female ratio	29:71	30:70	50:50 (NSW)
Mean age	51.7 (\pm 14.8) yrs	41.2 (\pm 12.8) yrs	-
Median age	males 51 yrs females 51 yrs	males 40 yrs females 42 yrs	males 37 yrs females 35 yrs (NSW)
Married	64%	60%	52% (NSW)
Separated/divorced	13%	6%	11% (NSW)
Widowed	3%	4%	7% (NSW)
Single	17%	24%	24% (NSW)
De facto	3%	6%	6% (Aust)
University education	26%	47%	18% (Aust)
College education	30%	23%	29% (Aust)
Completed high school	20%	23%	23% (Aust)
Some high school	15%	7%	-
Primary school	9%	0%	-
Full-time/part-time work	40%	86%	65% (Aust)
Casual work	5%	3%	-
Retired	20%	6%	-
Student	3%	1%	-
Home duties	20%	4%	-
Unable to work due to pain	9%	0%	-
Unemployed	3%	0%	6% unemployed (Aust)

(NSW)=NSW population, (Aust)=Australian population 15-64 years, - = figures not available from census data.

*General population figures were obtained from the most appropriate data sources within the Australian Bureau of Statistics and include the NSW total population group and the Australian 15-64 years population group. Australia’s estimated resident population at 30 June 2002 was 19.7 million with 12.9 million aged 15-64 years. The NSW total population was 6.4 million

classification systems of the IASP and the American Academy of Orofacial Pain. In addition, the diagnosis of temporomandibular disorder conformed to the Research Diagnostic Criteria (RDC) protocol.⁹

The chronic pain group (n=238) was composed of 68 males and 170 females with a mean age of 51.7 (\pm 14.8) years. The diagnoses were neuropathic pain (n=127; including burning mouth syndrome, n=9), temporomandibular disorder (n=69), neuropathic pain with secondary temporomandibular disorder (n=28), neuralgia (trigeminal n=10, glossopharyngeal n=1) and other (cervicogenic headache, n=1; osteoarthritis, n=1; pathology, n=1).

Control group subjects (n=177) were recruited by asking each orofacial pain patient to give the questionnaire to a friend of the same sex and age group to complete. Several controls were obtained from spouses/partners of hospital staff and accompanying persons of patients undertaking dental treatment at the private practice of ERV. The authors’ institution is based in a large university teaching hospital in northern Sydney. Patients were referred by medical and dental practitioners from across New South Wales including metropolitan Sydney, large regional cities and rural

Fill in a circle that describes how much you are troubled by the following feelings or thoughts:

- ①=not at all
- ①=slightly troublesome
- ②=definitely troublesome
- ③=severely troublesome

Type of feeling	Fill in one circle
feeling sad or miserable	① ② ③
feeling irritable or angry	① ② ③
feeling tense or panicky	① ② ③
distressing thoughts that come to you	① ② ③
feeling frustrated	① ② ③
feeling anxious, worried	① ② ③

Fig. 1 Sample questionnaire given to subjects showing psychological variables, instructions for completion and four point intensity scale.

districts. Several patients were referred from interstate. Thus the distribution of localities in the pain and control groups may be considered as being representative of the New South Wales population. However, based on the hospital clinic's location the authors acknowledge a potential bias from a higher number of local referrals (and controls) from the northern half of the Sydney metropolitan area. To identify potential bias appropriate figures were obtained from the Australian and New South Wales general population census recorded by the Australian Bureau of Statistics for comparison (Table 1).¹⁰

The psychological variables of depression, anger, fear, distress, frustration and anxiety were adapted from Price¹¹ and the World Health Organization Collaborating Centre in Evidence for Mental Health Policy (G Andrews, The University of New South Wales at St Vincent's Hospital, Sydney, Australia). Intensity of the variable was marked by the subjects using a four point scale (0=not at all, 1=slightly troublesome, 2=definitely troublesome, 3=severely troublesome) (Fig 1).

The personality table formulated by the authors was derived from words and lists after reviewing psychological/personality questionnaires and the general pain literature. The personality screening instrument was comprised of 83 words with an additional empty word space for each subject to complete if another word not on the list was more relevant. Subjects were asked to mark the six words that described his/her personality. Pain subjects completed one table describing personality before the onset of pain (pre-pain) and another table indicating their present personality with pain. The table consisted of 27 positive personality words, 38 negative personality words and 18 miscellaneous words (Fig 2). This was the first version of the instrument with the short-term test-retest reliability (three hours) and preliminary assessment of validity (face validity, content validity and criterion validity) as the primary variables to be measured. Detailed statistical analysis

- absent minded
- adaptable
- affectionate
- agitated
- ambitious
- amusing
- angry
- anxious
- apathetic
- apprehensive
- athletic
- busy – occupied
- calm
- careful
- careless
- caring
- cautious
- cheerful
- complaining
- confident
- confused
- conscientious
- contradictory
- courageous
- critical
- dejected
- demanding
- despondent
- dissatisfied
- distrustful
- dogmatic
- doubtful
- excitable
- fearful
- fixed ideas
- flexible
- forgetful
- forsaken
- frightened
- generous
- gentle
- happy
- headstrong
- helpless
- high achiever
- hopeful
- hopeless
- hysterical
- impatient
- impulsive
- inconsolable
- industrious
- inquisitive
- introspective
- irritable
- kind
- laughing
- lively
- lonely
- moody
- negative
- over-sensitive
- perfectionistic
- positive
- quarrelsome
- quiet
- relaxed
- resentful
- restless
- sad
- sentimental
- serious
- sharing
- sociable
- sorrowful
- suicidal
- talkative
- tearful
- technical
- unfriendly
- weary of life
- witty
- worrier
- other word?

Fig. 2 Example of a completed personality word list for a patient with pain. The subject was a 54 year old female with a diagnosis of neuropathic pain with secondary temporomandibular disorder of 23 years duration and a pain intensity rating of six (0 = 'no pain', 10 = 'worst pain imaginable'). In the pre-pain state the subject had marked her personality words as busy-occupied, calm, hopeful, perfectionistic, positive and quiet.

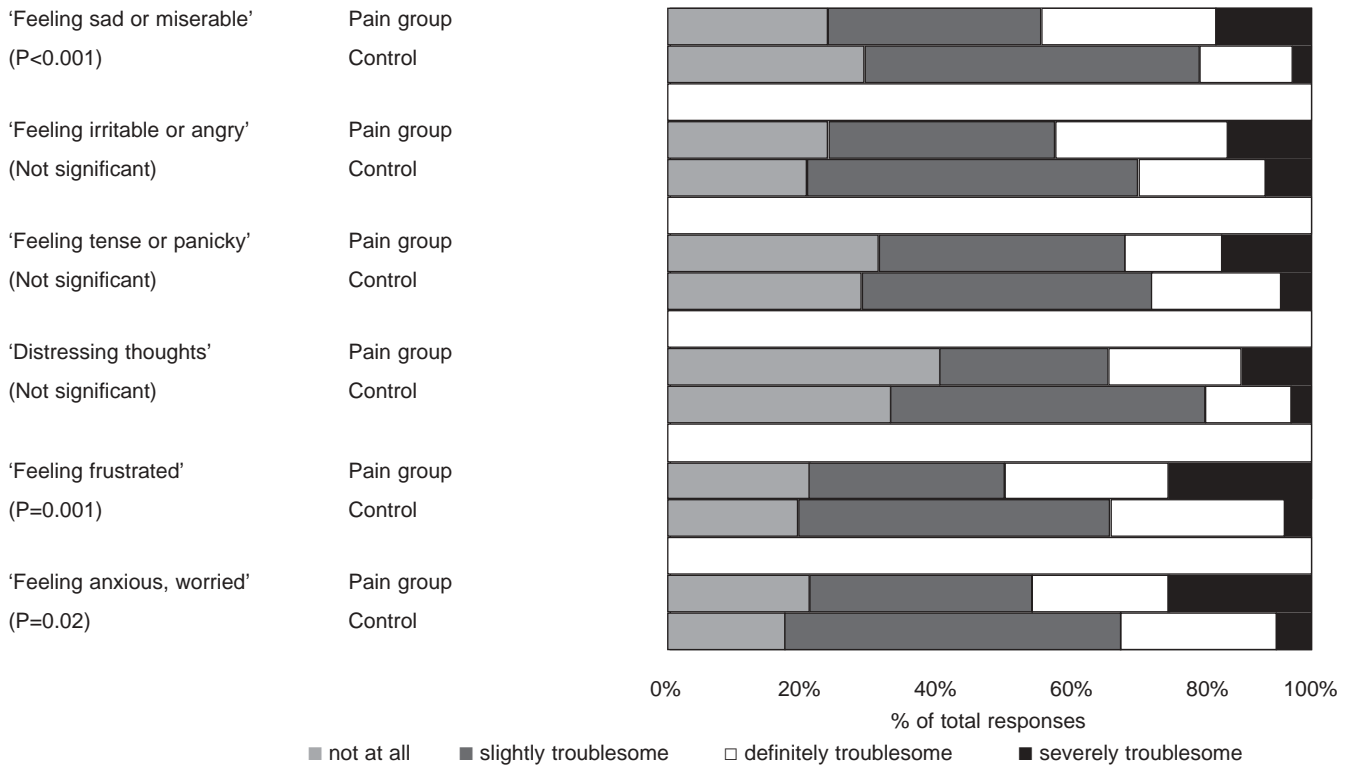


Fig. 3 Comparison of the four point intensity pain and control group responses for each psychological variable. Each intensity is shown as a percentage of the total number of responses.

for constructs of personality subsets (Cronbach's alpha for depression, anxiety and anger) and the responsiveness statistic (i.e., effect size) were not included at this stage as the instrument is under further development.

The study was approved by the local area health human research ethics committee.

Statistical analyses (SPSS, SigmaStat version 2.03) were performed with the Mann-Whitney rank sum test for intensity of variables, the Fisher exact test for the non-presence/presence of variables and Pearson product moment for correlations for the psychological variables, pain intensity and duration of pain. The personality table comparing controls and the pain group and the effect of pain within the pain group used the chi-square test with Yates correction factor where appropriate.

RESULTS

Chronic pain group – demographic and socioeconomic data

The marital status of the group showed 64 per cent were married, 13 per cent divorced or separated, three per cent widowed, 17 per cent single and three per cent de facto. The level of education showed 26 per cent completed university, 30 per cent college/TAFE, 20 per cent completed high school, 15 per cent some high school and 9 per cent primary school only. The employment status of the group showed 40 per cent were engaged in full or part-time work, 5 per cent in casual work, 20 per cent were retired, 3 per cent were students, 20 per cent home duties, 9 per cent were

unable to work due to pain and 3 per cent were unable to work for other reasons.

Control group – demographic and socioeconomic data

The control group was comprised of 53 males and 122 females with a mean age of 41.2 (± 12.8) years. The marital status of the control group showed 60 per cent were married, 6 per cent divorced or separated, 4 per cent widowed, 24 per cent single and 6 per cent de facto. The level of education of control subjects showed 47 per cent completed university, 23 per cent college/TAFE, 23 per cent completed high school and 7 per cent some high school. The employment status of the group revealed 86 per cent were engaged in full or part-time work, 3 per cent in casual work, 6 per cent were retired, 1 per cent were students and 4 per cent listed home duties.

Psychological variables

The chronic pain group reported increased levels of 'feeling sad or miserable' $p < 0.001$, 'feeling frustrated' $p = 0.001$ and 'feeling anxious, worried' $p = 0.02$ than the control group. There were no differences in severity for 'feeling irritable or angry' ($p = 0.42$), 'feeling tense or panicky' ($p = 0.41$) or 'distressing thoughts that come to you' ($p = 0.45$). There was no difference in the response frequency of non-presence compared to presence of any variable (i.e. 'not at all' versus 'slightly' or 'definitely' or 'severely troublesome' responses) between the groups. The four point intensity response rate comparing psychological variables between the pain and control groups are shown in Fig 3. There were

Table 2. Significance (p value) of relationships between age, pain intensity, duration of pain and psychological variables

	Pain intensity	Duration of pain	Depression	Anger	Fear	Distress	Frustration	Anxiety
Age	0.466	0.0176	0.318	0.04	0.151	0.0134	0.207	0.0323
Pain intensity		0.838	0.292	0.922	0.556	0.638	0.458	0.834
Duration of pain			<0.0001	0.0003	0.0107	0.0006	0.0008	<0.0001
Depression				<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Anger					<0.0001	<0.0001	<0.0001	<0.0001
Fear						<0.0001	<0.0001	<0.0001
Distress							<0.0001	<0.0001
Frustration								<0.0001

significant correlations between duration of pain and all psychological factors where the longer the duration of pain caused an increased severity of psychological morbidity. Significant correlations were observed between age and several psychological variables where increasing age was identified with lower levels of anger (p=0.04), distress (p=0.01) and anxiety (p=0.03). (Table 2, 3). Within the chronic pain group, patients with full or part-time work (n=92) were compared with patients unemployed due to pain or other reasons (n=27). Patients with employment reported a lower incidence of 'feeling sad' (p=0.04) and 'feeling frustrated' (p=0.047). Subjects unemployed due to pain (n=21) compared with unemployed due to other reasons (n=6) reported significantly higher levels of 'feeling frustrated' (p=0.037) and with a trend of having higher levels of 'feeling irritable or angry' (p=0.072).

The major pain states of neuropathic pain, neuropathic pain with secondary temporomandibular disorder and temporomandibular disorder were compared in the chronic pain group. Subjects in the temporomandibular disorder group were significantly worse for all variables compared with those with neuropathic pain: 'feeling sad or miserable' (p=0.015), 'feeling irritable or angry' (p=0.019), 'feeling tense or panicky' (p=0.029), 'distressing thoughts that come to you' (p=0.022), 'feeling frustrated' (p=0.025) and 'feeling anxious, worried' (p=0.002). There were no significant differences for psychological variables in subjects with temporomandibular disorder compared with neuropathic pain-temporomandibular disorder, nor those with neuropathic pain compared to subjects with neuropathic pain-temporomandibular disorder.

There were no significant differences in variables due to levels of education or gender between the chronic pain and control groups or within subsets of the pain group.

In addition, there were no significant correlations between pain intensity and psychological variables.

Personality changes

In comparing the control and pre-pain group in the selection of words describing their personality profiles the pre-pain group yielded two words that were more frequently reported, 'agitated' and 'confused' (p<0.05) but generally there was no difference in personality profiles. The orofacial pain group demonstrated clear and widespread evidence of negative change in personality profiles due to persistent pain (Table 4). These patients, prior to the onset of pain, were people who were 'affectionate', 'calm', 'cheerful', 'generous', 'happy', 'kind' and 'sociable'. As a result of the pain this group had been transformed into people who were 'anxious', 'complaining', 'irritable' and 'sad'. When comparing percentages of marking positive words and negative words in the table the control group scored 67 per cent of words chosen as positive and 10 per cent negative, the pre-pain group scored 62 per cent of words chosen as positive and 13 per cent negative and the 'with pain' group scored 23 per cent of words chosen as positive and 58 per cent negative.

There were only three 'other word' descriptors completed from 1230 completed words (six words from 100 controls and six words from 105 pain subjects). The personality table thus demonstrated excellent face validity of describing a comprehensive range of descriptors used by the general population, pre-pain group and the corresponding group with pain. Furthermore, there were a similar number of responses comparing the control and pre-pain groups for most frequently used positive key words (e.g. adaptable, calm, cheerful), infrequently used negative descriptors (e.g. apprehensive, sad) and miscellaneous words (athletic, witty). Preliminary assessment of this initial

Table 3. Pearson product moment correlations between age, pain intensity, duration of pain and psychological variables

	Pain intensity	Duration of pain	Depression	Anger	Fear	Distress	Frustration	Anxiety
Age	0.0489	0.159	-0.0683	-0.139	-0.0996	-0.176	-0.0856	-0.148
Pain intensity		0.0141	0.0741	-0.0069	0.0421	0.0347	0.0518	-0.0150
Duration of pain			0.280	0.251	0.181	0.247	0.230	0.275
Depression				0.631	0.646	0.708	0.671	0.724
Anger					0.616	0.621	0.680	0.584
Fear						0.737	0.599	0.756
Distress							0.604	0.710
Frustration								0.662

Table 4. Word list of the personality table showing total number of responses and statistical significance for each word between the control group and the orofacial pain group, pre-pain and with pain

Word	Control group responses (n=100 controls)	Pre-pain responses (n=105 subjects)	With pain responses (n=105 subjects)	P value (control vs pre-pain)	P value (control vs with pain)	P value (pre-pain vs with pain)
Absent minded	2	2	10			
Adaptable	20	16	9			
Affectionate	15	27	12			0.042
Agitated		8	14	0.019	0.001	
Ambitious	7	4	2			
Amusing	9	3	1		0.026	
Angry	1	8	18		<0.001	
Anxious	6	1	26		0.003	<0.001
Apathetic		1	4			
Apprehensive	1	1	9		0.038	0.032
Athletic	10	8	2		0.042	
Busy-occupied	28	40	19			0.023
Calm	19	22	5		0.009	0.004
Careful	10	17	13			
Careless		1	1			
Caring	38	21	11	0.049	<0.001	
Cautious	7	5	13			
Cheerful	17	23	4		0.010	0.001
Complaining			14		0.001	<0.001
Confident	10	17	9			
Confused		8	12	0.019	0.003	
Conscientious	25	22	12			
Contradictory	1		1			
Courageous	1	2	4			
Critical	4	2	4			
Dejected		1	11		0.004	0.012
Demanding	3	1	4			
Despondent		1	12		0.003	0.007
Dissatisfied	1	2	13		0.006	0.013
Distrustful			3			
Dogmatic						
Doubtful	1	1	7			
Excitable	1	2	1			
Fearful		2	10		0.007	
Fixed ideas		4	2			
Flexible	12	8			0.016	
Forgetful	7	4	9			
Forsaken			2			
Frightened		1	6			
Generous	25	17	6		0.002	0.050
Gentle	8	10	4			
Happy	34	44	9		<0.001	<0.001
Headstrong	13	3	2	0.025	0.010	
Helpless			9		0.011	0.009
High achiever	9	1	3	0.026		
Hopeful	8	9	7			
Hopeless			6			0.045
Hysterical						
Impatient	8	9	20			
Impulsive	3	1				
Inconsolable			3			
Industrious	2	7	1			
Inquisitive	7	3	2			
Introspective	6	3	6			
Irritable			25		<0.001	<0.001
Kind	26	18	3		<0.001	0.004
Laughing	15	16	2		0.004	0.003
Lively	8	9			0.013	0.009
Lonely	3	2	11			0.032
Moody	4	2	13			0.013
Negative	1		8			0.016
Over-sensitive	6	9	12			
Perfectionistic	15	11	6			
Positive	17	25	13			
Quarrelsome						
Quiet	10	16	18			
Relaxed	10	7	2		0.042	
Resentful			3			
Restless	3	5	13		0.039	
Sad	1	1	21		<0.001	<0.001
Sentimental	9	2			0.008	
Serious	5	11	10			
Sharing	10	3	1		0.016	
Sociable	21	19	4		0.002	0.006
Sorrowful	1	1	3			
Suicidal			4			
Talkative	17	17	6		0.039	0.050
Tearful	1	2	16		0.002	0.003
Technical	1					
Unfriendly			1			
Weary of life	1	2	8			
Witty	3	4	1			
Worrier	11	13	16			
Other word?	1	2				

Chi-square test with Yates correction factor where appropriate (P value).

version demonstrated good content validity for depressive symptoms (21 and 16 responses for sad and tearful, respectively), anxiety (26 and 16 responses for anxiety and worrier, respectively), and anger and irritation (18 and 25 responses for angry and irritable, respectively). Criterion validity was also considered excellent when compared with the Price/WHO four point item list. Statistical significance for depression was $p < 0.001$ for both the four point item list and the personality list. There was a higher level of significance using the personality list for anxiety ($p < 0.001$ from the personality list and $p = 0.02$ from the four point list).

Test-retest results at three hours (pain group, $n = 5$ and control group, $n = 14$) showed the same words were used in 68 out of 102 responses. The five subjects from the pain group had a range of using the same words from two to six from six words (mean = 0.7) and the 14 subjects in the control group had a range of using the same words from one to six (mean = 0.56).

DISCUSSION

Scope of the problem

The pool of patients with pain in this study were derived from both medical and dental general practitioners and specialists. The authors' institution is a multidisciplinary pain centre in a tertiary referral hospital accepting all patients irrespective of location and type of pain. The authors' clinical expertise and research interests focus on orofacial pain. Innervation of the orofacial region and head primarily involves the trigeminal nerve with an additional contribution around the lower border of the mandible from the dorsal roots of the cervical vertebrae (C2-4). Pain maps of persistent pain states such as neuropathic orofacial pain reveal it often spreads to other areas of the head over time.¹² Differential diagnoses for head pain, and hence orofacial pain, must include headache syndromes and cervicogenic pain that is present in a much larger section of the patient population.

However, the relative frequency of diagnostic pain states for these subsets of head pain (headache, cervicogenic and orofacial pain) has not been well documented. Determining the prevalence of the orofacial pain group in head pain relies largely on interpolation of data from epidemiological studies where 73 per cent of the population report headache¹³ but only 6 per cent with chronic orofacial pain (excluding toothache).¹⁴ Despite the absence of accurate figures a comparison of pain intensity for head pain states (headache and orofacial diagnoses) shows similar levels of pain intensity based on the multidimensional McGill Pain Questionnaire (MPQ). If the assumption that physiological sensory input (i.e. trigeminal nerve) is similar for orofacial pain compared with other head pain states then the emotional (affective) response of patients with temporomandibular disorder and neuropathic pain-temporomandibular are equal to that of psychiatric tension headache.⁷ Appropriate dental assessment of chronic orofacial pain subsequently

warrants a component to measure psychological factors such as a questionnaire for depression and anxiety.

There was no compelling evidence from this study that orofacial pain is a psychoanalytical model of pain. Despite this psychological factors can be the basis for the emergence of orofacial/head pain in some patients. For example, external stress factors are recognised to play a crucial causal role in tension headache or temporomandibular disorder without pathology (i.e., bruxism and myofascial pain). These patients can be easily observed in the clinical setting when they are 'agitated' or 'confused' due to stress and as identified in the significantly higher report of these words in the pre-pain personality table. With pain defined as a 'sensory and emotional experience', and the pre-pain state having no sensory nociceptive input but maintaining high levels of negative psychological stimuli, then an appropriate direction of research suggests further study into stress factors and the psychological states of experimental pain. Complex neurobiological mechanisms and neuroanatomical pathways linking sensory and psychological components are now being investigated with techniques such as magnetic resonance imaging combined with spectroscopy to identify key chemical transmitters involved in sensory pain and associated emotional/psychological effects. Psychological states such as depression and anxiety are regulated by hormonal (biological) changes and, rather than segregated as distinct entities and as non-causal factors in pain, are inextricably linked with the awareness and response to nociception and should be considered as such in research. Tissue injury (even innocuous) and nociception is the triggering mechanism for pain but psychological factors are known to play an important role in increasing, decreasing or maintaining pain. Following the recognition of pain (i.e. initial onset) is the possibility of its progression to a chronic pain phase. This persistent (chronic) pain phenomenon is exceedingly complex and involves further changes such as maladaptive neuronal plasticity in central and phantom pains. Importantly, this pain is not imagined and repudiates the simplistic Cartesian pain model where amputation of the painful injured body part resolves pain. This is an important concept for the dentist where routine procedures use ablative treatments (caries removal, pulp extirpation and tooth extraction) to remove the source of acute inflammation and nociception. In neuropathic pain there is no nociception, with pain generated by neuropeptides such as substance P, neuropeptide Y and calcitonin gene-related peptide. Further procedural or surgical treatment is contra-indicated as continued intervention results in an increase in pain by further neuropeptide release and a spreading nature to the pain via nerve growth factor expression causing collateral sprouting to adjacent and previously undamaged nerve fibres. Complicating the pain situation further for the procedurally focused dentist is the onset of psychological morbidity and the emergence of pain

maintained by the sympathetic nervous system through circulating catecholamines from stress. Prior to commencing any dental procedure in a patient with chronic orofacial pain is the need to obtain evidence of the origin of pain (tooth, peripheral or central nervous system), the nature of the pain (e.g. nociceptive, mechanical, neuropathic or myofascial pain) and determining the presence and influence of psychological factors on the pain.

Psychological factors

Psychological morbidity, particularly depression, as a consequence of pain has been extensively documented in the literature. Conversely, the question of pain arising solely from psychological factors, i.e. psychogenic pain (the psychoanalytical formulation of pain), has attracted opinions and anecdotal reports yet has not been firmly established. This theory proposes intractable pain that cannot be explained with an organic basis is a defence against unconscious psychological conflict. This psychoanalytical approach to pain was first proposed in 1959 by Engel⁸ and reiterated in 1982 by Blumer and Heilbronn¹⁵ describing the 'pain-prone personality'. More recently, Turk and Melzack have reviewed this subject and declared the theory that psychological variables were the sole causal factors in the development of chronic pain as 'futile'.¹⁶ The data from this current study show no strong association between personality and the development of chronic orofacial pain in the general population. For example, 'hysterical' was one of the words that could have been chosen but was not marked by any of the control or pre-pain group responses rebutting the hysterical (conversion) mechanism of pain, i.e. pain can be a hysterical symptom.¹⁷ However, several words were chosen with a significantly different number of responses between the control and pre-pain groups suggesting that a subset of the population may be 'pain-prone'. Patients with pain were more likely to be agitated and confused in their pre-pain description and less likely to have a mental direction in life (high achiever) or be mentally 'tough and focused' (headstrong).

The four point scale showed three items (sadness, frustration and anxiety) that were significantly higher in intensity but no difference as to the absence compared to the presence of the feeling for all six items. The presence of these feelings within the control group (60-80 per cent in a group representing western society) using a simplified four point scale warrants careful interpretation of using this questionnaire as a single unit of measure. Alternatively, the personality word list offers a wider choice and each word marked could be considered as more representative of the 'outstanding' characteristics of the individual. Moreover, the number of words chosen indicating an opposite change in personality description may more accurately reflect the degree of psychological morbidity. This parallels the use and interpretation of the MPQ. In the full version

of the MPQ there are 20 groups of ranked word descriptors (sensory, affective and miscellaneous word groups) that can be calculated for different intensity rating scales. Interestingly, the scale that correlates significantly with the visual analogue pain intensity scale is the MPQ Number of Words Chosen Index for chronic orofacial pain and there is a large choice of affective words in the MPQ. However, the MPQ-Short Form uses a four point intensity scale on a smaller list of words. This questionnaire has 15 words that are biased towards clinical assessment of sensory pain (11 sensory words, four affective words) for selecting appropriate pharmacotherapeutic drugs (e.g. severe shooting pain). Considering that negative and positive psychological factors can have powerful influences on reported pain intensity, similar to a prescribed drug based on sensory words, then psychological words should be afforded the same proportional exposure on pencil and paper instruments. While more comprehensive and discriminating questionnaires exist such as the Depression, Anxiety, Stress Scales (DASS), Beck Depression and Anxiety Inventories (BDI, BAI) and Minnesota Multiphasic Pain Inventory (MMPI) these instruments are impractical for use in the dental clinic and need analysis by a psychologist to code for distinctive psychological traits. In contrast, the word descriptors used in this study are rapidly completed by patients. The responses are simple to interpret by clinicians and alerts them to "red flags" in chronic pain such as anxiety and depression.

In this controlled study, patients with chronic orofacial pain reported more evidence of depression ('feeling sad or miserable') and anxiety ('feeling anxious or worried') compared with levels in the general population. A patient feeling frustrated may compound sadness or anger. For example, frustration coupled with sadness may indicate a patient who has lost confidence in his/herself or sees no end to the pain and potential suicidal ideation. In other situations frustration with anger can cause major difficulties in commencing treatment programmes, particularly if there are long delays with the legal system in compensation matters where a third party injury has caused the pain. These combined psychological changes in turn restrict the improvement in patient outcomes including long-term employment prospects and must be identified and treated. Employment was found to be a significant factor in reducing sadness and frustration in the pain group. Employment allows positive distractions to the pain and reinforces the confidence of the patient to be an active and contributing member of society. Gainful employment provides an improved financial state for the patient (and family) with less reliance on welfare. These combined factors are acknowledged as important contributors in positive outcomes of patients undertaking pain management programmes. There is a major emphasis on a return-to-work approach that reduces pain and depression.^{18,19}

Longer duration of pain was associated with an increased level of psychological morbidity for all measured variables. This finding supports the need for early and comprehensive treatment of sensory pain to prevent a worsening of the pain problem with the onset of psychological factors. Once these factors have been identified in the patients then assessment and treatment should be multidisciplinary and adopt the biopsychosocial approach. Interestingly, an increase in the age of these patients was associated with a decreased level of anger, distress and anxiety. One possible reason is the acceptance of the pain problem in the older patient. Sympathetic advice from the clinician to the patient of the likelihood that pathophysiology of the body emerges in some form but can be treated is helpful. For example, explaining that medical problems such as cancer, diabetes, cardiovascular disease, dementia or chronic pain have a genetic base, is widely prevalent in the population and is not the patient's fault is reassuring, i.e. they are not responsible for the pain nor are they suffering alone. Following a clinical explanation and the realization on the part of the patient that most forms of chronic pain, such as neuropathic pain or myofascial pain, are not associated with life-threatening pathology is likely to reduce fear and anxiety.

The control group showed similar prevalence rates of psychological variables compared with the pain group but intensity ('severely troublesome') was higher in the pain group for sadness, frustration and anxiety. The analysis of the control group produced one surprising and alarming statistic where 20-25 per cent of the population are 'definitely or severely troubled' by frustration, anxiety/worry, irritation/anger, sadness and distressing thoughts.

Personality words

The personality list was found to be a simple and useful instrument for the patient to complete. An advantage with the instrument is that the clinician can review the table with the patient directly and discuss appropriate directions of referral to the family doctor, clinical psychologist/psychiatrist or pain clinic. In the pain clinic setting, the authors could quickly identify patients using a greater number of (negative) words indicating complex and widespread negative changes had occurred. Other patients focused on one construct of change (e.g. sad, tearful suggesting depression) that directed treatment toward antidepressant therapy. Other words used such as 'hopeless' and 'suicidal' mandated an early psychiatric referral. The first version of this instrument showed good validity but insufficient reliability (<0.9) over short-term retesting. This may have been due to the large available word selection and limited number of words that could be chosen (six words) from the list. A second version is currently under development with a shorter word list to improve the reliability of this instrument.

Guidelines

Feelings and thoughts are, arguably, the defining features of the personality of the human being and hence the patient in pain seeking dental treatment. Results from this study show that individuals recognize and disclose, when prompted, their feelings of sadness, anxiety and frustration. When attending the dental surgery these feelings may be actively displayed or reported to the clinician, e.g. the patient with a physical or verbal display of 'explosive' uncontrolled anger. At other times the patient may exhibit a flat mood demonstrated by a sad reclusive manner, passive physical appearance and be non-communicative. It is important that the dentist recognize and acknowledge that these states exist and may be affecting the patient's general health. While it would be considered 'normal' for all people in the general population to experience feelings of being sad or miserable, irritable or angry, tense or panicky, frustrated, anxious/worried, it is the frequency coupled with the intensity of these feelings that may overwhelm certain individuals and contribute to a downward spiral in pain psychopathology. It is now well recognized that physical health deteriorates when there is coexisting psychological morbidity such as depression.²⁰ In particular, pain and depression have been acknowledged as powerful co-morbidities and multidisciplinary treatment utilizing pharmacotherapy (analgesic drugs, antidepressants and anxiolytics) and cognitive behavioural therapy is the current gold standard in chronic pain management.

Once psychological morbidity has been preliminarily identified by the treating dentist then a multidisciplinary biopsychosocial approach to these patients is warranted and, when indicated, specifically includes psychological/psychiatric assessment and treatment. One major limitation for rural dentists is access to specialist pain clinic services. A combination of the dentist utilizing both instruments is suggested by the authors where the personality list indicates the need for referral and the intensity scale indicates the urgency of the referral particularly where 'severe' is marked for feeling sad, frustrated or anxious. A suitable guideline for rural clinicians with these chronic pain patients is contacting the patient's medical practitioner and advising them of the presence and severity of depression or anxiety in order that antidepressant/anxiolytic medication should be considered (and usually commenced) by the doctor. This allows stabilization of the patient for subsequent referral to a rural base hospital where a regional pain clinic has been established or to a city hospital pain clinic. Dentists should carefully explain how persistent pain can cause depression/anxiety and showing the completed questionnaire to the patient reaffirms how he/she has changed because of the pain. In addition, the material provides a brief summary of pertinent information in referral correspondence to a pain clinic as the dentist has identified both sensory and psychological components of the patient with pain.

Chronic pain is defined as pain that has been present for longer than three months.² Patients with pain of this or longer duration should have a preliminary pain assessment by the dentist covering sensory aspects of pain and clinical questioning of how the pain is affecting the individual such as mood change, interference with daily activities and whether there is a disturbed sleep pattern. Direct questions to the patient are necessary but for some patients a written questionnaire provides a suitable and neutral method of interrogation in aspects of pain that may be difficult for the dentist to verbally broach.

The frequent selection of words indicating depression (sad, tearful, despondent), anxiety, irritability and social dysfunction are in agreement with the marked features found in patients attending pain clinics.¹⁷ This study found an enormous change from positive words in the pre-pain state to negative words in the state with pain raising concerns of the serious impact of pain to the individual. The authors have previously reported on the severity of persistent orofacial pain states using numerical rating scales and the MPQ in the Australian population showing this location of pain rates very high in pain intensity.⁷ Results from this study add to the impact of its presence and reveal marked negative psychological and personality changes occur in patients with chronic orofacial pain.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the financial support of the Australian Dental Research Foundation Inc.

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