Association between psychosocial factors and pain in patients with trigger finger

Stephen A. Kennedy · Ana-Maria Vranceanu · Fiesky Nunez · David Ring

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Abstract

Purpose To test the hypothesis that psychological factors correlate with pain intensity in trigger finger (TF).

Methods Patients with TF were selected from two previous cohort studies measuring pain intensity and psychological parameters, 82 from one study and 72 from another. Correlation testing and multiple linear regression was performed. Measures included the pain catastrophizing scale (PCS), pain self-efficacy questionnaire (PSEQ), patient health questionnaire depression (PHQ-D) scale, center for epidemiologic studies depression (CES-D) scale, pain anxiety symptoms score (PASS), and the eysenck personality questionnaire (EPQ-R) scales.

Results There was moderate correlation between pain intensity and PCS ($\rho = 0.52$; $P < 0.001$) and PSEQ ($\rho = -0.36$; $P < 0.001$). There was weak correlation between pain and PHQ-D ($\rho = 0.23$; $P = 0.019$). No significant correlation existed with CES-D or EPQ-R. PCS accounted for 26% of the variance in pain for patients awaiting surgery ($P < 0.001$).

Conclusion Self-reported pain in TF has moderate correlation with psychological factors, most predominantly pain catastrophizing.

Keywords

Introduction

Variations in pathophysiology such as the location, duration, and severity of triggering, do not adequately account for the variability in pain complaints in patients with idiopathic trigger finger. Psychological and social factors account for a notable percentage of the variation in pain intensity and disability in many areas of the body [1–5]. Evidence that patients with a discrete pathophysiological process in the hand experience pain commensurate with their mood and interpretation of nociception would encourage physicians and surgeons to address these important aspects of the illness experience, thereby optimizing health and recovery. The purpose of this study was to test the hypothesis that specific validated measures of depression, anxiety in response to nociception, or pain catastrophizing have moderate or greater (i.e. $r \geq 0.30$) correlation with self-reported pain intensity in the idiopathic trigger finger population.

Materials and methods

Study design and setting

A sample of convenience was used for a retrospective analysis. Cross-sectional data was obtained from two larger prospective cohort studies involving patients with hand and upper limb illnesses. The studies were performed at a large academic tertiary referral center with recruitment of participants from November 2006 to November 2008 (group 1) and November 2001 to July 2004 (group 2.) Informed consent was obtained from each patient and our Institutional Review Board approved the questionnaires.

Participants

The study population consisted of patients with an isolated diagnosis of trigger digit, 82 from one study (group 1)

Stephen A. Kennedy¹ · Ana-Maria Vranceanu² ·
Fiesky Nunez² · David Ring² (✉)

¹Department of Orthopaedics, University of British Columbia,
Vancouver General Hospital, 3114-910 W 10th Avenue,
Vancouver BC, V5Z4E3, Canada

²Massachusetts General Hospital/Harvard Medical School
Yawkey 2100, 55 Fruit Street,
Boston, MA, 02114

e-mail: dring@partners.org

and 72 from another (group 2). Patients with co-existing diagnoses in the same limb were excluded. The diagnosis of trigger finger was based on the reproducible demonstrating of objective triggering on examination in the office; diagnosis was not made based on pain or a history of triggering alone. All patients were selected from the same outpatient clinic. Group 1 patients were evaluated with the questionnaires shortly after giving informed consent to proceed with surgical release. Group 2 patients filled out the questionnaires at any time point in the course of evaluation and treatment (but prior to surgical intervention).

Measures

The following data were collected on self-administered questionnaires. Self-reported pain intensity was the primary outcome. All patients reported the intensity of their pain during the previous week on a five point Likert scale on the Disabilities of the Arm, Shoulder, and Hand questionnaire, with one point representing no pain and 5 points representing extreme pain. The responses conformed to a Gaussian-shaped distribution, both on graphical analysis and Shapiro-Wilk tests of normality.

Generalized Pain Anxiety was measured in all patients using the pain anxiety symptoms scale – 20 (PASS-20, the short version of the PASS) [6]. The PASS-20 is a validated 20 question inventory designed to assess anxiety about pain [6]. It has four dimensions: (1) cognitive anxiety, (2) fear of pain, (3) escape and avoidance, and (4) physiological anxiety [6]. The cognitive-anxiety subscale evaluates symptoms such as the inability to concentrate and the frequency of unwanted thoughts when the patient is in pain [6]. The fear-of-pain subscale measures the frequency of thoughts provoking fear and a profound dread of negative consequences when the patient is in pain [6]. The escape and avoidance subscale rates the frequency of behaviors aimed at minimizing the severity and duration of pain. Finally, the physiological-anxiety subscale measures the patient's physical response to pain, such as palpitations or feeling nauseous [6]. The sum of the subscales comprises the total pain anxiety score [6].

The pain catastrophizing scale (PCS) was used to determine the extent to which the patients coped with their pain by catastrophizing (i.e. performing cognitive activities that exacerbate the fearful aspects of the pain experience) [7]. This was measured only in group 1. The PCS is a validated scale that measures the three components of pain catastrophizing: rumination, magnification, and helplessness [7]. Rumination is the tendency to regurgitate thoughts about pain and relive painful experiences. Magnification is the inclination to believe that pain represents an undiagnosed serious or worsening problem. Helplessness is an inability to mitigate pain symptoms or a submission to pain [7]. Thirteen questions are scored on

a 5-point system from 0 points corresponding to 'not at all' to 4 points corresponding to 'all the time', corresponding to a total possible score is 52 [7]. Possible subscale scores are 0 to 16 points for the rumination, 0 to 12 points for magnification, and 0 to 24 points for helplessness [7].

Depression was measured with the patient health questionnaire – depression scale (PHQ-D) in group 1, and the center for epidemiologic studies – depression (CES-D) scale in group 2 [8, 9]. These are both reliable and valid measures of depressive symptoms within the past week [8–10]. The PHQ-D has 9 questions taken directly from the diagnostic and statistical manual of psychiatry IV (DSM-IV), answered on a continuous scale from one to four [8, 10]. The CES-D has 20 questions assessing typical depressive symptoms, answered on a continuous scale from zero to three [9].

Pain Self Efficacy was measured only in group 1 using the pain self-efficacy questionnaire (PSEQ) [11, 12]. The PSEQ is a ten-item tool that measures both the strength and generality of a patient's beliefs about his or her ability to accomplish a range of activities despite his or her pain [11, 12]. Each item on the PSEQ is rated, selecting a number on a seven-point scale, where 0 equals 'not at all confident' and 6 equals 'completely confident' [11, 12]. A total score is calculated by summing scores for all ten items. A high score reflects strong self-efficacy beliefs [12].

Optimism was measured only in group 1 using the revised version of the life orientation test (LOT-R) [13]. It is a very brief 10-item questionnaire with a score produced from six of the responses that is intended to be a continuous measurement of individual differences in optimism vs. pessimism [13].

More stable dimensions of personality were assessed in group 2 using the Eysenck personality questionnaire – revised (EPQ-R) [14]. The EPQ-R was used to assess dispositional personality traits of the participants. It has been validated as a reliable tool to measure personality traits based on three aspects: Neuroticism, Psychoticism, and Extraversion [14].

Statistical analysis

Continuous variables were assessed for normality using graphical methods and the Shapiro-Wilk test. Continuous measures not approximating a normal curve were assessed using non-parametric methods. Missing data were replaced with imputed means where data loss was less than 15%. Otherwise the measure was to be excluded from analysis. No measures were excluded due to inadequate data.

Bivariate analysis between self-reported pain and the various socio-demographic, psychological, and illness-specific measures was performed. The two-independent

sample *t*-test was used to compare reported pain intensity in regards to binary variables, including gender, presence of other bodily pain, and smoking status. The *F* test based on one-way analysis of variance (ANOVA) was used to evaluate difference regarding categorical variables such as ethnicity, marital status, and work status. Bivariate analyses among continuous non-parametric study variables were conducted using the one-tailed Spearman rank-correlation coefficient (ρ).

Each group assessed different psychological measures. Correlation analyses were conducted for the combined population, group 1 alone, and group 2 alone. For the combined population, correlation was reported between pain intensity and PASS-20 score. For group 1 alone, Spearman correlation coefficients (ρ) were produced for PCS, PHQ-D, PSEQ, and LOT-R. For group 2 correlation coefficients were reported for CES-D and the three EPQ-R subscales of Neuroticism, Psychoticism, and Extraversion. We felt that a correlation coefficient greater than $r = 0.30$ would be clinically important. We defined strong correlations as having $r > 0.60$, moderate correlation as $r = 0.30$ to 0.60 , and weak correlation as $r < 0.30$.

Multiple linear regression analysis was then performed to control for confounding and model potential relationships between significant correlates and pain. We set an arbitrary cut-off for significance of $P < 0.10$ for inclusion in the model. All significant variables were entered into the model, and forward and backward stepwise regression analyses were performed. The optimal multiple regression model was reported, and statistically significant independent predictors of the outcome were identified.

A sample size calculation was performed using G*Power software (version 3.0.10, Kiel, Germany). We used a correlation coefficient of $r \geq 0.30$, an alpha of 0.05 and power of 80%, and this corresponded with a sample size $n = 67$. The study sample size was adequate to detect the primary outcomes in the combined group and in group 1. In group 2, weaker correlations may not have been detected, particularly where $n < 67$. We were therefore careful not to make strong conclusions about negative results in these circumstances.

Results

Social and demographic characteristics of the study population are presented in Table 1. The average age was 60 ± 11 years. Almost two-thirds (64%) were female. Fifty-five percent were working full- or part-time, and thirty percent were retired. About 5.3% were unemployed, either due to disability or other reasons. The majority of patients described their ethnicity as white (85%) and the next largest group as black (8%), with smaller numbers of other groups.

The mean reported pain intensity score for the combined group of 154 patients was 2.6 ± 0.88 out of 5.

There was no statistically significant difference in pain score on the basis of age ($P = 0.46$), gender ($P = 0.30$), ethnicity ($P = 0.62$), marital status ($P = 0.35$), smoking status ($P = 0.46$), or duration of symptoms ($P = 0.24$). There was a difference in pain indicated on the basis of work status ($P = 0.027$), with increased pain scores for unemployed respondents, both for those off work due to disability and for those who are off work for other reasons. Patients with other bodily pain also appeared to have greater pain than those without other pain (2.8 ± 0.93 vs 2.4 ± 0.75 ; $P = 0.01$). All psychological measures showed high levels of internal reliability (Cronbach Alpha).

Results of bivariate correlation analysis are presented in Tables 1 and 2. In the combined group of 154 subjects, years of education (14.6 ± 2.9 years) had a weak negative correlation with pain intensity (2.6 ± 0.88 ; $\rho = -0.218$, $P = 0.009$), suggesting that higher levels of education correlated with lesser scores of self-reported pain.

In group 1, there were significant correlations between self-reported pain intensity (2.7 ± 0.91) and the PCS (20.7 ± 8.7 ; $\rho = 0.52$, $n = 82$, $P < 0.001$), the PHQ-D (12.1 ± 4.7 ; $\rho = 0.23$, $n = 82$, $P = 0.019$), the PASS-20 (17.6 ± 17.4 ; $\rho = 0.24$, $n = 82$, $P = 0.016$), the PSEQ (44.4 ± 11.6 ; $\rho = -0.36$, $n = 82$, $P < 0.001$) and number of years in education (14.8 ± 3.0 years; $\rho = -0.20$, $n = 82$, $P = 0.035$). There was no significant correlation between pain and the optimism scale LOT-R (7.3 ± 4.8 ; $r = 0.056$, $n = 82$, $P = 0.31$).

In group 2 there was a weak negative correlation between pain intensity and number of years in education (14.3 ± 2.7 years, $\rho = -0.23$, $n = 58$, $P = 0.023$). There was no difference in pain intensity between males and females ($n = 72$, $P = 0.927$), and no correlation between pain and age ($n = 72$, $P = 0.907$), CES-D ($n = 72$, $P = 0.34$), PASS-20 ($n = 55$, $P = 0.16$), EPQ-R Neuroticism ($n = 68$, $P = 0.23$), EPQ-R Psychoticism ($n = 68$, $P = 0.24$), or EPQ-R Extraversion ($n = 68$, $P = 0.23$).

Multiple linear regression modeling was performed for the significant continuous covariates identified in group 1. When all covariates were entered, a model was created reporting pain as a function of PCS, PHQ-D, PASS-20, PSEQ, and years of education ($F = 6.92$, $R^2 = 0.31$, $P < 0.001$). This model explained 31% of the variance in pain intensity. Backward and forward regression analysis was performed, creating an optimal model with pain as a function of PCS ($R^2 = 0.26$, $P < 0.001$), with pain catastrophizing alone explaining 26% of the variance in pain intensity.

As a post hoc analysis, we decided to do a backward stepwise linear regression analysis with the subgroups of each of PCS and PASS-20. See Table 3. The PCS helplessness subscale was independently significant ($P = 0.024$) and backward stepwise regression produced an optimal equation with pain as a function of the PCS

Table 1. Demographic summary data, with comparisons of pain score (out of 5) between groups, and correlation analysis for continuous variables

			Pain score $\pm$ standard deviation	Correlation coefficient	<i>P</i> value
Age in years (<i>N</i> = 154)		61.0 $\pm$ 11.4	2.6 $\pm$ 0.88	<i>r</i> = 0.060	0.46
Gender	Male	55 (35.7%)	2.5 $\pm$ 0.11	N/A [†]	0.30
	Female	99 (64.3%)	2.7 $\pm$ 0.09		
Ethnicity	White	131 (85.1%)	2.6 $\pm$ 0.08	N/A [‡]	0.62
	Black	12 (7.8%)	3.1 $\pm$ 0.25		
	Asian/Pacific Islander	5 (3.2%)	2.0 $\pm$ 0.0		
	Hispanic	3 (1.9%)	3.7 $\pm$ 0.67		
	Other/not answered	3 (1.9%)	2.3 $\pm$ 0.33		
Marital status	Married	92 (60.1%)	2.6 $\pm$ 0.09	N/A [‡]	0.35
	Living with partner	7 (4.6%)	3.1 $\pm$ 0.26		
	Single	25 (16.3%)	2.5 $\pm$ 0.19		
	Separated/divorced	15 (9.8%)	2.6 $\pm$ 0.21		
	Widowed	14 (9.2%)	2.6 $\pm$ 0.25		
Work status	Working full time	63 (41.2%)	2.4 $\pm$ 0.10	N/A [‡]	0.027*
	Working part time	21 (13.7%)	2.6 $\pm$ 0.13		
	Homemaker	12 (7.8%)	2.3 $\pm$ 0.22		
	Retired	47 (30.5%)	2.8 $\pm$ 0.15		
	Unemployed, able to work	3 (2.0%)	3.0 $\pm$ 0.58		
	Unemployed, unable to work	5 (3.3%)	3.4 $\pm$ 0.24		
	Other	2 (1.3%)	4.0 $\pm$ 0.0		
Total years of education (<i>N</i> = 140)		14.6 $\pm$ 2.9	2.6 $\pm$ 0.88	ρ = −0.22	0.005*
Duration of time since first pain symptom in months (<i>N</i> = 70)		10.9 $\pm$ 11.6		ρ = 0.14	0.24
Other pain in the body	Yes	86 (57.9%)	2.8 $\pm$ 0.93	N/A [†]	0.01*
	No	64 (42.1%)	2.4 $\pm$ 0.75		
Smoking status	Yes	5 (6.2%)	2.8 $\pm$ 0.45	N/A [†]	0.63
	No	76 (93.8%)	2.7 $\pm$ 1.0		

*Statistically significant, [†]Two independent sample *T*-test, [‡]One-way analysis of variance (ANOVA)

Table 2. Bivariate correlation analysis for continuous covariates in group 1 (*N* = 82)

	Correlation (ρ)	<i>P</i> value
Catastrophizing (PCS)	0.52	<0.001*
Pain self-efficacy (PSEQ)	−0.36	0.001*
PASS-20 score	0.24	0.016*
Depression (PHQ-D)	0.23	0.019*
Optimism (LOT-R)	0.056	0.31

*Statistically significant

helplessness subscale ($P < 0.001$), the PASS-20 cognitive anxiety subscale ($P = 0.003$), PHQ-D ($P = 0.045$), and the PASS-20 escape-and-avoidance subscale ($P = 0.052$). This equation explained 39% of the variance in pain intensity ($R^2 = 0.39$, $P < 0.001$).

Discussion

Psychological factors, pain catastrophizing in particular, were significantly correlated with pain intensity in patients with trigger finger. Pain catastrophizing refers to ‘an exaggerated negative orientation toward noxious stimuli’ [7]. For example, rated responses from the PCS questionnaire include statements like ‘I can not seem to keep it out of my mind’ (rumination subscale), or ‘I wonder whether something serious may happen’ (magnification subscale), or ‘I feel I can not go on’ (helplessness subscale) [7]. Patients who have a tendency to catastrophize, or who suffer from depression or anxiety may not be as capable of adapting to their symptoms as other patients. The helplessness subscale of the PCS questionnaire seemed to have the strongest correlation with pain intensity in the post hoc analysis.

Table 3. Secondary analyses of bivariate correlation with sample specific reliability of tests ($n = 82$)

	Correlation (ρ)	P-value
PCS – Helplessness	0.55	<0.001*
PCS – Rumination	0.49	<0.001*
PCS – Magnification	0.35	0.001*
PASS-20 – Escape-and-avoidance	0.31	0.002*
PASS-20 – Fear-of-pain	0.27	0.008*
PASS-20 – Cognitive-anxiety	0.17	0.065*
PASS-20 – Physiological anxiety	0.015	0.45

*Statistically significant

Social factors such as fewer years of education and unemployment or disability correlated with pain; however, based on the multivariable statistical models these were not independent predictors of pain, but rather confounders of the psychological variables. The relationship between psychological and sociological aspects of hand and arm illness behavior warrants further study.

These findings are consistent with previous studies that have shown that psychosocial factors are as important or more important than disease-specific factors in reports of pain intensity and disability in several conditions including back pain, neck pain, joint pain, muscle soreness, and headaches [1, 2, 4]. Evidence is mounting that self-assessed disability and pain is related as much or more to illness behavior than to pathophysiology [1–5]. The findings of this study are notable in part because trigger finger is a discrete pathophysiological process – much of the literature relates to ongoing pain where there is typically poor correlation of symptoms and pathophysiological processes [3].

Cognitive aspects of illness may be conceptualized as lenses through which patients ‘see’ or experience their disease; they may magnify their suffering, dysfunction, and disability, but these can also be modified and attenuated. In one recent example from the cancer literature, a brief preoperative counseling session by a psychologist before mastectomy not only decreased pain intensity, nausea, and unpleasantness, but also reduced operating room time, propofol and lidocaine requirement, and cost [15]. Likewise, other studies have shown that catastrophizing can be significantly reduced or eliminated by interventions that foster the use of effective coping strategies [7]. Awareness of the association between catastrophizing and pain may help surgeons to identify and ameliorate misconceptions that are increasing pain intensity and disability, adding an important component to the management of this illness.

There are several limitations to this study. We used a convenience sample of data collected for other purposes. To strengthen our findings, this work should be repeated with a prospective study design addressing correlates of

pain as the primary study question. We did not have the same questionnaires for the entire population but the a priori sample size calculation suggested that our sample sizes were adequate to detect at least the moderate correlations we felt would be meaningful to a practicing hand surgeon. Weaker correlations in the data would have to be evaluated in future in a larger study.

In conclusion, this study demonstrates a significant correlation between psychosocial factors (pain catastrophizing in particular) and self-reported pain intensity in patients with trigger finger. Awareness of this relationship is important because these factors are treatable via Cognitive Behavioral Interventions [5, 7, 15]. Biomedical treatments such as corticosteroid injections and surgical releases can be augmented with an approach that also addresses the psychosocial aspects of the illness.

Our study suggests that patients presenting with substantial amount of pain in the context of trigger finger may benefit from a discussion of their cognitions and behaviors (automatic thoughts or ‘gut feelings’) in response to nociception. Surgeons should also be vigilant for undertreated depression when patients with trigger finger have substantial complaints of pain. It is our hope that such a biopsychosocial approach to illness in general and trigger finger specifically will lead to better use of resources, decreased disability, increased comfort, and improved quality of life.

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