

Physical and Emotional Functioning of Adult Patients With Chronic Abdominal Pain: Comparison with Patients with Chronic Back Pain

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Abstract: Adults with chronic abdominal pain remain a poorly defined population, despite the debilitation and depression associated with this therapeutically challenging condition. This study compared patients with chronic abdominal pain with an empirically well-known group of patients with chronic pain (back pain) to investigate similarities and differences in their physical and mental functioning. This retrospective, cross-sectional study included 136 patients with abdominal pain and 364 patients with back pain seen in a comprehensive pain rehabilitation center. Patients' functioning was assessed with the Short Form-36 Health Survey, Multidimensional Pain Inventory, Center for Epidemiological Studies–Depression scale, and Coping Strategies Questionnaire–Catastrophizing subscale. Both the abdominal and back pain patients reported long-standing and severe pain, numerous surgery procedures, poor functioning, and high prevalence of depression. When age, education, and marital status were controlled for, analyses showed that although patients with abdominal pain reported significantly better physical functioning than patients with back pain ($P < .001$), their overall health perception was significantly poorer ($P < .001$). Although less prevalent, it is clear that patients with chronic abdominal pain exhibit poor functioning and prevalence of depression that are comparable to patients with chronic back pain. This study also suggests distinct characteristics that are vital to consider for effective treatment of this chronic pain population.

Perspective: As a result of being an overlooked and poorly defined population, adults with chronic abdominal pain might not receive adequate pain management treatment. Learning more about the physical and emotional functioning of patients with long-standing abdominal pain can increase recognition of the needs of and improve treatment for this population.

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Key words: Chronic abdominal pain, chronic back pain, rehabilitation

Chronic noncancer pain is one of the major reasons patients seek medical care^{62,63} and is associated with poor quality of life¹⁷ and significant levels of depressive symptoms.³⁴⁻³⁶ To date, research on chronic noncancer pain has primarily described the most common pain conditions including chronic musculoskeletal pain and intractable migraines and headaches; however, adults with chronic abdominal pain remain a poorly defined population in the general pain literature, and there is minimal research describing characteristics of these patients.³⁷ This paucity of research might limit the application of effective rehabilitation treatments because health care providers are unaware of the potential

benefits and might in fact underestimate or overestimate the functioning of patients with chronic abdominal pain. This limitation in the literature suggests the need for further research to investigate functioning in patients with chronic abdominal pain.

Depending on method and population sampled, the few epidemiologic studies on chronic abdominal pain report varying prevalence rates (3.0% to 17%); however, they do suggest the importance of targeting this population for further research.^{3,22,51,61} Studies conducted with large community samples or hospital populations imply chronic abdominal pain is a pervasive problem. Abdominal pain was the third most common pain complaint of individuals enrolled in a large health maintenance organization⁶¹ and the fourth most frequent chronic complaint in a large community sample representing the adult population in the United States.⁵³ In a subpopulation of patients presenting for treatment of pain at a general practice clinic, Frolund and Frolund²² found that 9.8% of the patients had gastrointestinal pain complaints, and of this subpopulation of patients with abdominal pain, 45% were identified as having

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chronic conditions persisting for at least 3 months. Almost one fifth (16%) of patients admitted to a Danish hospital with acute abdominal pain continued to report abdominal pain symptoms 5 years later.²⁹

Chronic abdominal pain can be a debilitating condition, resulting in poor quality of life for the patient, costly and potentially dangerous medical testing, and a high burden of consumption of medical resources.³⁸ Empirical literature on patients with chronic abdominal pain has focused predominantly on recurrent abdominal pain in children and adolescent populations.^{9,10,19,26,43} The available research on adults has generally focused on specific syndromes associated with abdominal pain, such as irritable bowel syndrome,² disease-specific case studies,^{12,13,27,58} or outcomes of specific procedures.^{4,21,33}

Research on adults is limited by the complicated and often unknown etiologies presented with chronic abdominal pain. Physicians often experience considerable frustration in caring for patients with chronic recurrent or constant abdominal pain because of the diagnostic complexities and therapeutic challenge of attempting pain control with diseases that might not be satisfactorily treated.^{38,67} Edwards et al¹¹ found that in 14% of 150 patients, the physician was unable to make a diagnosis. Other research suggests diagnoses were not confirmed for even greater percentages of patients. De Dombal⁵ found that almost half (43%) of the patients presenting to a hospital with abdominal pain had no specific etiologic diagnosis after an extensive medical workup. In a longitudinal study of patients admitted to a hospital with acute abdominal pain, 32% received no diagnosis after admission, and 10% maintained a diagnosis of "nonspecific abdominal pain" at the 5-year follow-up.²⁹ Similarly, follow-up studies of adults with long-standing abdominal pain with negative medical evaluations showed that specific etiologies were identified in less than 10%.^{7,8}

Diagnostic efforts to identify a visceral etiology for the abdominal pain often result in expensive diagnostic testing and invasive procedures that can burden the clinician and the health care system, as well as take a significant emotional and physical toll on the patient. In addition, an inability to identify a specific etiology might lead physicians to conclude that the chronic abdominal pain is psychosomatic or label the pain as a "functional" gastrointestinal illness,^{7,8} which can also be demoralizing. Successful treatment of chronic abdominal pain is often as elusive as identifying the etiology. In a retrospective chart review of patients with chronic abdominal pain of unknown etiology, McGarrity et al³⁸ found that the majority of the patients (70%) had reported initial complete or substantial pain relief from pain treatments (ie, trigger-point injections, intercostal nerve blocks, narcotic medications, nonsteroidal anti-inflammatory agents, and tricyclic antidepressants or gabapentin). However, at 6 months after treatment, the 30% of patients who had not responded to these interventions and almost one third of patients who had initially had pain relief continued to describe severe abdominal pain that interfered with daily activities, mood, and social interaction.

Despite the limited research on adults with chronic abdominal pain, existing studies agree these patients are at increased risk for depressive symptoms.^{37,61} In a survey of Hispanic Americans by the United States National Center for Health Statistics, Magni et al³⁷ found that individuals who reported chronic abdominal pain reported a significantly higher frequency of major depression (Center for Epidemiological Studies-Depression scale [CES-D], ≥ 20) than individuals without chronic pain, 40% described increased immobility because of pain, and one fourth (25.8%) used pain medications. In addition, in a stratified random sample of individuals enrolled in a large health maintenance organization, Von Korff et al⁶¹ found that 5.9% of this community population who had abdominal pain during the past 6 months had possible major depression by the SCL-90 depression scale. This prevalence of depression was comparable to that of the individuals with chronic back pain (6.4%) and was almost 3 times higher than that of the individuals without pain (2.0%). In addition, almost one third (32.2%) reported activity limitations, 22.5% rated their health status as fair or poor, and 32.5% reported significant family stress.

In this body of research on chronic abdominal pain, because of the liberal definitions of chronic pain, it is difficult to fully appreciate the characteristics of patients who have abdominal pain for extended periods of time. These studies potentially describe different samples of patients because the inclusion criteria vary from individuals who have abdominal or lower chest pain for at least 30 days during the past 12 months,³⁷ pain in duration of at least 3 months,²² or if pain had been present any time during the last 6 months including individuals with pain problems of very brief duration.⁶¹ It is reasonable to expect significantly elevated depression and impaired functioning in patients who have had abdominal pain for several years, have undergone numerous surgical procedures, and have increasingly experienced activity limitations.

Finally, from a clinical perspective, patients with chronic abdominal pain often exhibit behavioral and psychologic comorbidities that would not be present in other pain populations. It is not uncommon for patients with chronic abdominal pain to have significantly altered their diet in response to gastrointestinal distress, pain, nausea, and vomiting. These alterations often involve restriction of certain foods, elimination of solids, and even ritualized eating patterns. In addition, many of the diagnostic procedures might worsen gut function as do many analgesic preparations. In conjunction with altered dietary habits, patients with abdominal pain often experience the effects of weight loss and malnutrition. These patients might also have recurrent nausea and vomiting in relation to their pain and disease state.

Clearly, further research is needed to better understand characteristics of patients who have long-standing chronic abdominal pain, promote a greater advocacy of care for these patients, and develop adequate treatment interventions to improve their physical functioning, mood, and overall quality of life. The complexity and prevalence of chronic abdominal pain in adult populations and increased

risk of depression, significant medical comorbidity, and decreased functioning require greater attention to this population. Although previous research does emphasize the challenges of diagnosing and treating this pain population, there have been no studies to clarify distinct similarities and differences in treating patients with chronic abdominal pain compared with other well-investigated chronic pain conditions, such as chronic back pain.

Chronic back pain is one of the most prevalent sites of chronic pain in the general population,³ as well as in general practice clinics²² and among enrollees of health maintenance organizations.⁶¹ In addition, a review of treatment outcome studies for chronic pain shows the majority of studies involved patients with primary diagnoses of chronic back pain,^{20,41} making patients with chronic back pain one of the most empirically studied pain populations. Research with diverse pain populations has suggested some similarities between patients with back and with abdominal pain. For example, despite the greater lifetime prevalence, patients with chronic low back pain also have difficulty determining definite pathologic diagnoses.¹⁸ In an attempt to estimate the prevalence of medically unexplained symptoms in patients who frequently attend outpatient medical services, Reid et al⁴⁶ found that referrals remained unexplained in 71% of individuals with back pain and in 73% of patients with gastrointestinal complaints, including abdominal pain. In addition, from a psychosocial perspective, both musculoskeletal (including back pain) and abdominal pain are associated with depressive symptoms,³⁷ and stress was voluntarily mentioned as a major cause of pain in individuals with back and abdominal pain.⁵⁴ Research has also revealed differences to consider between the 2 pain groups. In patients presenting with pain to a primary care clinic, patients with nonspecific abdominal complaints exhibited decreased emotional and social functioning compared with patients with low back pain who endorsed patterns of restricted physical movement.²⁸ Although the studies involving patients with abdominal and back pain provide insight into important clinical characteristics, the research and conclusions are limited in their generalizability toward chronic pain populations because they involve patients with acute abdominal complaints, including nonpain complaints (eg, bowel habit change, constipation).^{28,46}

The current study is designed to improve our understanding of a population of patients with long-standing chronic noncancer abdominal pain seen for treatment at a comprehensive pain rehabilitation center. This will be achieved by (1) comparing this population of abdominal pain patients with chronic back pain patients (a more well-known and researched group of chronic pain patients), to further understand their level of physical and mental functioning, (2) describing this population's complex medical histories including comorbid medical health concerns and past experience of abdominal surgical procedures, (3) presenting patients' perceptions of their overall functioning and health status, and (4) identifying prevalence of major depression. It is hypothesized that adult patients presenting to a rehabilitation program

with chronic abdominal pain will exhibit poor emotional functioning compared with patients with chronic back pain. In addition, it is hypothesized that review of medical records of this chronic abdominal pain population will reveal numerous abdominal surgeries. This research further offers the potential to serve as a baseline for future investigation into adult patients with chronic abdominal pain referred for treatment to a pain rehabilitation center and will allow comparison with other chronic pain populations and patients presenting with abdominal pain at general practice clinics.

Material and Methods

Study Design

The study was a retrospective, cross-sectional study with descriptive and comparative data of adult patients with chronic abdominal pain and chronic back pain presenting for admission to a comprehensive pain rehabilitation program.

Study Sample

Of the 1597 patients admitted to the Mayo Comprehensive Pain Rehabilitation Center from January 1998 to December 2002, 137 (8.6%) of the patients were diagnosed with primary chronic abdominal pain, and 380 (23.8%) patients had chronic back pain; 134 (97.8%) abdominal pain patients and 366 (96.3%) chronic back pain patients provided consent for use of their medical records for research and formed the study cohort (N = 500). Abdominal pain was ranked as the fifth most frequent chronic pain diagnosis of patients admitted to the pain rehabilitation program. Back pain was ranked as the most frequent pain diagnosis followed by chronic headache (11.4%), generalized (nonfibromyalgia) pain (10.6%), and fibromyalgia (10.1%). This study was approved by the Mayo Foundation Institutional Review Board.

Procedure

Demographic and clinical information about pain duration, surgeries and invasive procedures, and comorbid medical and mental health diagnoses were obtained from patients' medical records. On admission to the clinic, patients completed self-report standardized measures assessing health perception, pain severity, functional status, pain coping, and depression. These measures are given to every patient on admission to the rehabilitation program and are used primarily for treatment planning.

Measure of Psychosocial Functioning and Health Status

The Multidimensional Pain Inventory (MPI) is a widely used measure of psychosocial functioning in patients with chronic pain; it emphasizes subjective experience of pain, distress, and suffering and the perceived effect of the pain on various aspects of daily life.³⁰ The psychometric properties of this measure have been found to be

Table 1. Characteristics of Patients With Chronic Abdominal Pain and Chronic Back Pain Admitted to the Mayo Comprehensive Pain Rehabilitation Center 1998-2002 (N = 500)

CHARACTERISTIC	ABDOMINAL PAIN (N = 134)	BACK PAIN (N = 366)
Age (y, mean [SD])*	42.3 (13.5)	47.4 (14.3)
Sex (% female)	68.7	65.8
Ethnicity (% white)	89.7	95.9
Marital status (% married)*	59.7	69.1
Education (y, mean [SD])†	14.8 (2.7)	13.7 (2.6)
Completed high school (% yes)	96.2	91.5
Pain duration (y, mean [SD])	6.3 (6.9)	8.4 (11.4)

* $P < .001$.

† $P < .05$.

adequate.^{6,47} The current study focused on the following 5 subscales: pain severity, interference due to pain, perceived life control, affective distress, and general activity level. Raw scores are transformed to standardized scores by using software designed to score the MPI.⁵⁰

The Short Form-36 Health Survey (SF-36) assesses physical and emotional health attributes.⁵⁵ Health status and well-being are assessed in 8 subscales that evaluate individuals' perceptions of the degree of limitation in performing various physical activities (Physical Functioning), limitations on performance of activities of daily living (Role-Physical), degree of physical pain (Bodily Pain), overall perception of health (Health Perception), vitality (Energy/Fatigue), degree of interference with social activities as a result of physical and emotional health (Social Functioning), limitations on work and other activities as a result of emotional health (Role-Mental), and feelings of nervousness or depression (Mental Health). Items are scored on a 2-point, 3-point, 5-point, or 6-point Likert scoring system. Each item is converted to a scale of 0 to 100, and subscales are summed and averaged, resulting in a high possible score of 100. Standardized T scores, scaled so that the mean score was 50 with an SD of 10 for the reference population, were calculated with the use of published age- and sex-specific mean scores and SDs for the SF-36 scales in the general US population.⁶⁴ This score transformation has previously been used with the SF-36 to report patients' scores in terms of SD units from the mean achieved by the normative sample.⁶⁰ Higher scores reflect greater functioning and more favorable health status. The SF-36 has demonstrated high reliability and good construct validity^{23,39,40} and has been used to assess functioning and health-related quality of life in patients with chronic pain.^{1,14,15,51}

Measure of Depressive Symptoms

The Center for Epidemiologic Studies Depression Scale (CES-D)⁴⁵ is a 20-item measure of the presence and severity of depressive symptoms. It contains 4 factors that assess general depression, positive affect, interpersonal

difficulties, and somatic symptoms. Items are answered on a 4-point Likert scale, with 0 representing "rarely" to 3 representing "most of the time." Scores range from 0 to 60, with higher scores indicating more pronounced depressive symptoms. A standard cutoff score of 16 or greater has been suggested to correctly classify acutely depressed outpatients,⁶⁵ and a more conservative cutoff score of 20 has been suggested to identify individuals with increased risk for depression requiring intervention.⁴² However, more recently, Geisser et al²⁴ identified scores of 27 or greater as an optimal cutoff score for correctly identifying major depression in patients who have chronic pain. Test-retest reliability, internal consistency, and convergent validity have been shown to be adequate.⁴⁴ This measure has been used successfully in various studies to screen for depression in patients with chronic pain.⁵⁹

Measure of Pain Catastrophizing

The catastrophizing subscale from the Coping Strategies Questionnaire⁴⁸ was used in the current study. The 6 items are scored on a Likert scale from 0 ("not at all") to 6 ("always") on which patients indicate the frequency of negative pain-related cognitions. High scores on this subscale reflect negative expectancy about coping with pain. Pain catastrophizing has been broadly described as an "exaggerated negative 'mental set' associated with actual or anticipated pain experiences."⁵⁷ It has been associated with heightened pain in clinical and experimental studies of adults and children with diverse pain and is one of the most important psychologic predictors of pain experience. In addition, catastrophizing has been shown to be associated with heightened disability, increased pain behavior, greater use of health care services, longer durations of hospital stay, and use of analgesic medications.⁵⁷ The catastrophizing subscale has the most evidence of reliability and construct validity compared with other Coping Strategy Questionnaire subscales.⁵⁶

Results

Demographic and clinical data for the patients with chronic abdominal pain and chronic back pain are given in Table 1. The mean age of the patients with abdominal pain was 42.3 years (range, 18 to 83 years). Most of them were white (89.7%), female (68.7%), married (59.7%), and had completed high school (96.2%). Chi-square analyses for categorical variables and analysis of variance show significant demographic differences between the patients with abdominal pain and those with back pain. The patients with chronic abdominal pain were significantly younger, $F_{1,498} = 12.77, P < .001$, less likely to be married, $\chi^2(1, N = 500) = 3.92, P < .05$, and had completed more years of education, $F_{1,496} = 15.4, P < .001$, than had the patients with chronic back pain. There were no group differences in gender or ethnicity.

Patients typically had had chronic abdominal pain for a

Table 2. Invasive Abdominal Procedures and Surgeries Reported by Adult Chronic Abdominal Pain Patients Admitted to a Pain Rehabilitation Center (N = 134)

INTERVENTION	PATIENTS	
	No.	%
Cholecystectomy	51	38.1
Appendectomy	33	24.6
Bowel resection	24	17.9
Hysterectomy without ovary removal	22	16.4
Lysis of adhesions (abdomen)	20	14.9
Hysterectomy with bilateral salpingo-oophorectomy	15	11.2
Hernia repair	14	10.4
Endoscopic retrograde cholangiopancreatography	12	9.0
Exploratory laparoscopy	12	9.0
Salpingo-oophorectomy	12	9.0
Exploratory laparotomy	11	8.2
Sphincterotomy	9	6.7
Stent placement (pancreatic, ureter, biliary)	7	5.2
Cystectomy	6	4.5
Ileostomy	5	3.7

NOTE: Fewer than 3% of the patients reported undergoing all other surgeries or procedures before admission.

mean of 6.3 years (range, 6 months to 42 years); more than half (51.1%) reported pain for 4 or more years, 18.0% for 10 or more years, and 12.0% for 15 or more years. There were no pain group differences in pain duration. Many of the patients had undergone several abdominal surgeries and procedures (mean, 3.0; SD, 3.3) before admission to the rehabilitation program. More than three fourths of the patients (79.1%) reported having at least 1 abdominal surgery or invasive procedure, one third (32.8%) reported 4 or more surgeries, and one fifth of the patients (20.9%) reported 5 or more surgeries. Table 2 shows the frequencies of the most common invasive abdominal procedures and surgeries. The most common procedure reported by more than one third of the patients was cholecystectomy (38.1%), followed by appendectomy (24.6%) and bowel resection (17.9%). Comparatively, a review of medical charts showed that for patients with chronic back pain 81.6%, 42.5%, and 33.7% of the back pain patients reported having at least 1, 4 or more, and 5 or more invasive procedures and surgeries, respectively. The patients with back pain reported significantly more procedures, $F_{1,485} = 4.6, P = .03$, as a result of the high frequency of patients receiving multiple injections before admission to the rehabilitation program. The most common back pain procedure was a steroid epidural injection (35.2%), followed by transcutaneous electrical nerve stimulator unit (30.1%), laminectomy (26.5%), and spinal fusion (20.5%). Table 3 shows the frequencies of the most common invasive back pain procedures and surgeries.

Table 3. Invasive Back Procedures and Surgeries Reported by Adult Chronic Back Pain Patients Admitted to a Pain Rehabilitation Center (N = 366)

INTERVENTION	PATIENTS	
	No.	%
Steroid/caudal epidural injection	129	35.2
Transcutaneous electrical nerve stimulator unit	110	30.1
Laminectomy	97	26.5
Spinal fusion	75	20.5
Spinal facet joint injection	64	17.5
Sacroiliac joint injection	62	16.9
Myofascial/trigger point injection	51	13.9
Field block/nerve root block	38	10.4
Bursa injection	22	6.0
Radiofrequency ablation	4	1.1
Intradiscal electrothermal therapy	4	1.1

NOTE: Fewer than 1% of the patients reported undergoing all other surgeries or procedures before admission, including nerve resection and implanted electrical spinal cord stimulation.

The majority (n = 400, 80.0%) of the patients with chronic abdominal pain (n = 104) and chronic back pain (n = 296) had completed assessment questionnaires to assess their functioning level and mood. Given the interest in multiple dependent variables and multiple comparisons, multivariate analyses of covariance with Bonferroni correction ($\alpha = .003$) were used to decrease experiment-wise error rate and likelihood of making a type I error. Because previous research has suggested the relationship between various demographic variables and chronic pain disability,^{25,49} years of education, age, and marital status were selected as covariates in the multivariate analysis to control for the group differences found in demographics. Examination of scores showed suboptimal physical and emotional functioning for both pain groups. Multivariate analyses of covariance showed significant group differences in functioning based on responses to the SF-36 Health Survey (Table 4). Although patients with abdominal pain reported better physical functioning, $F_{1,399} = 21.34, P < .001$, their overall health perception, $F_{1,399} = 19.0, P < .001$, was significantly lower than for patients with chronic back pain. There were no significant group differences in limitations on activities of daily living (Role-Physical), limitations as a result of emotional health (Role-Mental), bodily pain, energy/fatigue, social functioning or feelings of nervousness or depression (Mental Health) because both groups exhibited significant and comparable impairment. Assessment of psychosocial functioning on the MPI showed that patients with chronic abdominal pain reported comparable pain severity, interference due to pain, perceived ability to control their life events and pain, affective distress, and general activity level to those of patients with chronic back pain, with no significant differences.

Table 4. Comparison of Physical and Emotional Functioning for Chronic Abdominal Pain Patients and Chronic Back Pain Patients Controlling for Covariates (Education, Age, and Marital Status)

VARIABLE	ABDOMINAL PAIN (N = 104)		BACK PAIN (N = 296)		P VALUE*
	MEAN	SD	MEAN	SD	
Pain severity (MPI)	48.2	9.8	48.0	9.4	.34
Interference with life (MPI)	49.1	10.9	48.9	9.0	.91
Perceived life control (MPI)	47.1	7.3	48.8	7.1	.03
Affective distress (MPI)	48.3	9.9	48.0	9.0	.64
General activity level (MPI)	53.6	10.2	52.8	9.8	.60
Health perception (SF-36)	30.4	13.8	37.5	11.9	.000†
Physical functioning (SF-36)	30.5	17.6	24.3	14.0	.000†
Role-physical (SF-36)	26.9	11.4	26.5	9.1	.05
Role-mental (SF-36)	37.0	13.3	36.6	13.0	.93
Body pain (SF-36)	26.9	8.7	28.5	8.0	.36
Energy/fatigue (SF-36)	34.3	10.1	34.8	9.6	.92
Social functioning (SF-36)	26.4	11.8	30.2	12.3	.03
Mental health (SF-36)	35.9	12.5	37.8	11.9	.11
CES-D	24.8	10.5	22.6	12.2	.10
Pain catastrophizing (CSQ)	17.5	9.2	15.3	8.3	.005

MPI, Multidimensional Pain Inventory (T scores); SF-36, SF-36 Health Survey (T scores); CES-D, Center for Epidemiological Studies-Depression; CSQ, Coping Strategies Questionnaire

*Two-tailed test. Bonferroni correction, $\alpha = .003$.

† $P < .001$.

Patient's responses on the CES-D revealed a high level of depressive symptoms for both the abdominal pain and back pain patients. Consistent with the SF-36 Mental Health and MPI Affective Distress subscales, there were no group differences in mean depression scores. With a cutoff score of 27 on the CES-D, 40.8% of the chronic abdominal pain patients and 37.9% of the chronic back pain patients were identified as having major depression.²⁴ With a less conservative cutoff score of 20 on the CES-D, almost two thirds (64.8%) of patients with abdominal pain and 57.7% of patients with chronic back pain endorsed significant risk of depression suggestive of the need for intervention.⁴² The abdominal pain patients reported a trend toward higher frequency of pain catastrophizing, $F_{1,399} = 8.0$, $P = .005$, compared with back pain patients, but this difference did not reach statistical significance ($\alpha = .003$).

Discussion

The results of this study supported the hypothesis that adult patients with chronic abdominal pain presenting to a pain rehabilitation center had a long history of suffering from pain, poor health status perception, high rates of depression, and significant limitations of physical, emotional, and social functioning. Compared with chronic back pain, both patient groups reported significant and comparable pain severity, high interference of

pain in their lives, low perceived life and pain control, and low levels of activity. On the basis of average SF-36 subscale T scores, both the abdominal and back pain patients rated their physical and emotional functioning almost 2 SDs below normative scores for the general US population and at least 1 SD below norms reported for individuals with back pain/sciatica during the past 6 months.⁶⁴ Furthermore, the abdominal and chronic back pain patients' functioning on the SF-36 was poor compared with scores reported by Fanciullo et al¹⁶ for patients with chronic spinal and radicular pain at a spine care center, thus further demonstrating the significant debilitation observed in patients presenting to a pain rehabilitation center.

Significant group differences emerged between patients with chronic abdominal pain and those with chronic back pain. Although both pain groups reported comparable long-standing pain, demographics revealed that abdominal pain has an earlier onset than back pain. In addition, chronic abdominal pain patients had endured an average of 3 invasive surgeries. Although the back pain patients were found to have significantly more invasive procedures overall ($P < .05$), many of these procedures involved injections compared with actual surgical procedures in the abdominal pain population. The high level of diagnostic and surgical interventions carries a high risk for iatrogenic problems for this population. The extensive mean duration of pain and high proportion of abdominal surgeries and procedures further illustrate the burden that chronic abdominal pain places on the patient and health care resources.

Although patients with chronic abdominal pain reported greater performance in physical functioning compared with patients with back pain ($P < .001$), their perception of their health was significantly worse ($P < .001$). Although not significant, a trend of greater pain catastrophizing in the abdominal pain patients was observed ($P = .005$, $\alpha = .003$). Although both pain groups are more similar than different in their overall low level of functioning, patients with chronic abdominal pain evaluate their personal health as poorer and believe their health is likely to get worse. It is possible that, despite slightly higher ability to perform physical activities compared with chronic back pain patients, the clinical features of chronic abdominal pain might have a unique effect on the self-perceptions of this patient group. Chronic abdominal pain is often associated with serious medical illness (eg, Crohn's disease, cancer), and as previously reviewed, there are high rates of abdominal pain of unknown etiology that is intractable despite numerous medical and surgical interventions. Medically unexplained symptoms are associated with high rates of disability,⁵² poor levels of physical and social functioning,⁶⁶ and higher prevalence of major depression.³² Uncertainty as a result of medically unexplained symptoms and concerns of serious medical illness might contribute to lower health perceptions in patients with abdominal pain. Past research supports this explanation because patients who felt they had not been given adequate explanations for their pain have greater anxiety and tend to

catastrophize more frequently.³¹ Overall, these findings support previous conclusions that patients with medically unexplained symptoms should be considered a focus for attention.⁴⁶

Contrary to expectation and despite the fact that the patients with abdominal pain reported significantly lower health perception, there were no group differences observed on any of the subscales assessing mood (ie, Affective Distress-MPI, Mental Health-SF-36, and CES-D). All 3 mood assessments revealed a high prevalence of depressive symptoms in this population of abdominal pain patients that was comparable to that of patients with chronic back pain. Patients presenting to a large tertiary care center with long-standing intractable pain despite major therapeutic efforts appear to have comparable feelings of hopelessness and decreased mood that transcend differences in specific pain site anatomy, etiology, and pathophysiology. A conservative cutoff score of 27 on the CES-D suggested that 40.8% of the chronic abdominal pain patients might have major depression. With a less conservative cutoff score (CES-D ≥ 20) almost two thirds (64.8%) of patients with abdominal pain endorsed significant risk of depression. The mean CES-D score and proportion of abdominal pain patients at risk for depression in this study were greater than those reported by Magni et al³⁷ in a study of Hispanic patients reporting abdominal pain. Differences in prevalence of depression in these studies of chronic abdominal pain patients might be attributable to methodologic variability in defining chronic pain, as well as other cultural or health factors. The high prevalence of depression in this population with long-standing chronic abdominal pain further supports the importance of research elaborating patient characteristics and potential interventions.

A limitation to this study is the study design. This is a cross-sectional study of a nonrandomized, convenience sample of patients referred to a pain rehabilitation program at a large tertiary hospital. A longitudinal analysis of patients with chronic abdominal pain would more

ideally provide the opportunity to investigate such factors as the duration of pain before surgical procedures and possible iatrogenic cause of chronic pain conditions as a result of surgical procedures before their eventual referral to a rehabilitation program. In addition, the generalizability of these findings to other populations of patients with chronic noncancer abdominal pain might be limited because of selection bias in the study sample. Patients in this study were predominately female and highly educated and, most significantly, have endured a long-standing history of pain compared with studies reporting more conservative definitions of chronic pain. The physical and emotional functioning of patients in this study might not represent a community population of patients with chronic abdominal pain or patients presenting to a general practice clinic.

In conclusion, adult patients with long-standing abdominal pain in this study exhibited poor functioning and a high prevalence of depression that were comparable to those of patients with chronic back pain. These findings illustrate the need for greater attention from the scientific community to this overlooked population of pain patients. Significant lower health perception in patients with abdominal pain and chronic back pain suggests future research should focus on identifying treatment strategies to target their specific concerns and to ultimately develop more effective treatments to improve the quality of life and functioning of these patients. Future research should assess the efficacy of currently available treatment programs to target depression symptoms and address physical, emotional, and social functioning limitations specific to patients with chronic abdominal pain.

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