Quality of Life Is Impaired in Men with Chronic Prostatitis

The Chronic Prostatitis Collaborative Research Network

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OBJECTIVE: **Health-related quality of life (HRQOL) impairment may be a central component of chronic prostatitis for men afflicted with this condition. Our objective was to examine HRQOL, and factors associated with HRQOL, using both general and condition-specific instruments.**

DESIGN: **Chronic Prostatitis Cohort (CPC) study.**

SETTING: **Six clinical research centers across the United States and Canada.**

PARTICIPANTS: **Two hundred seventy-eight men with chronic prostatitis.**

MEASUREMENTS AND MAIN RESULTS: **The Short Form 12 (SF-12) Mental Component Summary (MCS) and Physical Component Summary (PCS), and the National Institutes of Health Chronic Prostatitis Symptom Index (NIH-CPSI) were measures used. CPC subjects' MCS scores (44.0 ± 9.8) were lower than those observed in the most severe subgroups of patients with congestive heart failure and diabetes mellitus, and PCS scores (46.4 ± 9.5) were worse than those among the general U.S. male population. Decreasing scores were seen in both domains with worsening symptom severity ($P < .01$). History of psychiatric disease and younger age were strongly associated with worse MCS scores, whereas history of rheumatologic disease was associated with worse PCS scores. Predictors of more severe NIH-CPSI scores included lower educational level and lower income; history of rheumatic disease was associated with higher scores.**

CONCLUSIONS: **Men with chronic prostatitis experience impairment in the mental and physical domains of general HRQOL, as well as condition-specific HRQOL. To optimize the care of men with this condition, clinicians should consider administering HRQOL instruments to their patients to better understand the impact of the condition on patients' lives.**

KEY WORDS: **prostatitis; health-related quality of life.**
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Health-related quality of life (HRQOL) broadly describes how well an individual functions in life and his or her perceptions of well-being.[1] The measurement of HRQOL is important for understanding the impact of chronic disease and for informing patient management and policy decisions.[2] Although interest in examining HRQOL in chronic diseases has increased substantially in recent years, little is known about the HRQOL among men with chronic prostatitis.

In 1995, the National Institutes of Health/National Institutes of Diabetes, Digestive and Kidney Diseases (NIH/NIDDK) sponsored a workshop on chronic prostatitis, which catalyzed research efforts in this area, beginning with a new classification for the condition.[3] Subsequently, the NIH/NIDDK funded the Chronic Prostatitis Collaborative Research Network (CPCRN) to provide more information about the epidemiology, etiology, diagnosis, and treatment of this condition. As a first step to achieve these broad research goals, a longitudinal Chronic Prostatitis Cohort (CPC) study was established.

Chronic abacterial prostatitis (under NIH classification scheme, Type III),[3] the predominant type of prostatitis, is a common[4,5] and painful[6] condition, typified by pelvic area pain and lower urinary tract symptoms,[7,8] for which effective diagnostic techniques and treatment strategies remain elusive.[9–12] Wenninger et al.[13] have shown that the impact of chronic prostatitis on health status as measured by the Sickness Impact Profile (SIP)[14] is similar to that for patients with a history of myocardial infarction, angina, or Crohn's disease. However, the SIP is a generic health status measure, and further insights into the health status of men with chronic prostatitis may be gained from a disease-specific instrument. Generic health status measures are useful for comparisons across a variety of different diseases, while condition-specific measures reflect the impact related to the specific condition.[2]

The specific aims of this cross-sectional study of the first 278 men enrolled in the CPC study were: 1) to determine the impact of chronic prostatitis symptoms on HRQOL using validated generic and condition-specific indices; and 2) to identify the factors associated with worse chronic prostatitis symptoms.

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METHODS

Study Design

The Chronic Prostatitis Collaborative Research Network comprises six Clinical Research Centers (CRCs) and a Data Coordinating Center (DCC). The CRCs are located in Baltimore, Boston, Chicago, Los Angeles, Philadelphia, and Kingston, Ontario, Canada (See Appendix for the list of investigators). The DCC is located at the University of Pennsylvania in Philadelphia. Institutional Review Board approval was obtained at each site. Written informed consent was obtained from all study participants. Patient recruitment for the CPC study began in October, 1998, and continued through 2000. In this paper, we report HRQOL data from the first 278 participants enrolled into the cohort through December, 1999.

Participants enrolled in the CPC were treated by their physicians according to usual clinical care. The CPC study consists of a baseline screening phase and a longitudinal follow-up phase. The baseline screening phase, during which eligibility criteria were assessed and baseline data were collected, involved 1 or 2 clinic visits within 30 days of an initial visit. Serum, prostatic fluid, and semen specimens were also collected and stored in specimen banks for future use by CPC study investigators for research purposes. These baseline data, as well as data obtained from follow-up contacts and visits, were entered into a centralized database at the DCC using case report forms within a Data Management System deployed at the CRCs over the internet. Participants were evaluated every 3 months, alternating between telephone and clinic visits, after a series of monthly phone contacts during the first 3 months.

Study Population

The inclusion criteria for the CPC study population were males (any age) who had symptoms of discomfort or pain in the pelvic region for at least 3 of the 6 months immediately prior to the first baseline screening visit. The exclusion criteria included genitourinary cancer, prior prostate procedure or surgery, and neurological disease affecting the bladder. Eligible men who had used antimicrobial agents, had an active genitourinary infection, or a prostate biopsy within the past three months were deferred for 3 months, and at that time they were allowed to enter into the study. These inclusion and exclusion criteria were established at the 1995 NIH/NIDDK-sponsored Workshop on Chronic Prostatitis,[15] modified by the NIH Chronic Prostatitis Collaborative Research Network, adopted by the International Prostatitis Collaborative Network,[16] and used in previous clinical trials.[17,18]

Data and Specimen Collection

Each participant received a physical exam, underwent a 4-glass test,[19] uroflow study, and urethral swab, was asked to provide a sample of both semen and serum, and completed a voiding log. Information was also collected on symptoms and quality of life, demographic and lifestyle factors, medical history, prior treatments and procedures, and health resource utilization.

Measures

Symptom Assessment. Symptoms were assessed with the NIH Chronic Prostatitis Symptom Index (NIH-CPSI),[20] which contains 13 items focusing on the three domains of: 1) pain or discomfort (8 items); 2) urinary symptoms (2 items); and 3) quality-of-life impact (3 items). A pain subscore (ranging from 0 to 21) was derived for the 276 CPC study participants with complete data by adding the eight pain/discomfort item scores involving location, severity and frequency. For the remaining 2 participants, each having one missing pain location item (binary), a simple "mean imputation" for the missing item was implemented to adjust the pain summary score for the missing item. This single imputation methodology gives satisfactory results if the fraction of missing data is negligible, which in our case is less than 1%.[21] A urinary subscore (ranging from 0 to 10) was derived for the 278 CPC study participants by adding the two items on irritative and obstructive urinary symptoms. By combining the pain and urinary subscores, an overall chronic prostatitis symptom score, the pain and urinary score (ranging from 0 to 31), was obtained.

The combined pain and urinary symptom score was then categorized into mild (0 to 9), moderate (10 to 16) and severe (17 to 31), based strictly on the statistical distribution cutpoints associated with the 17th and 65th percentiles. As a result, patients classified as severe correspond to the "worst third" of the pain and urinary score distribution.

HRQOL Assessment. General HRQOL was assessed with the Short Form 12 (SF-12),[22] a 12-item, generic instrument that measures the following domains of HRQOL: physical functioning, role limitations due to physical health problems, bodily pain, general health, vitality, social functioning, role limitations due to emotional problems, and mental health. Scores range from 0 to 100; higher scores indicate better quality of life. Two SF-12 subscales can be computed, the Physical Component Summary (PCS) and the Mental Component Summary (MCS).

MCS and PCS scores for the general United States population, and in patients with different diseases (i.e., congestive heart failure [CHF] and diabetes mellitus [DM]) are available.[23] The mean is set at 50 for both MCS and PCS scores in the general population. Patients from the SF-12 validation studies were defined as having disease, such as CHF or DM, based on physician report. The two levels of severity of CHF were defined by the presence of dyspnea on one-block exertion or while lying flat, and the presence of complications and duration of diabetes defined the four levels of severity of DM. For our comparisons, we used the severity group 2 for CHF, and the severity group 4 for DM.

We used the quality-of-life impact subscore of the NIH-CPSI to measure condition-specific HRQOL. The quality-of-life impact subscore ranges from 0 to 12, and resulted from summing responses to the three items relating to impact of symptoms and overall quality of life. A higher score indicates worse quality of life.

Comorbidity Assessment. A comprehensive list of medical problems (past or present) was obtained from each study participant, according to 9 broad system areas: allergy, cardiovascular, dermatologic, endocrine/metabolic, gastrointestinal, hematopoietic/lymphatic/infectious, musculoskeletal/rheumatologic/connective tissue, neurologic, and psychiatric. These self-reported data were used as a crude measure of comorbidity.

Correlates of Chronic Prostatitis. The study participants' age (continuous), race (white/nonwhite), highest education achieved (≤high school; ≤college; graduate/professional), employment status (employed/unemployed [retired and disabled are included in unemployed]), income (<50K/≥50K), living status (partnered/not partnered), and duration (years) of chronic prostatitis symptoms (mean; SD) were included in the analyses.

Statistical Analyses

Sample means are presented for continuous variables, and prevalences are provided for categorical variables. Statistical tests for baseline associations between selected variables were computed within SAS Proc Freq (SAS version 6.12; Cary, NC) using generalized Mantel-Haenszel procedures (based on rank scores) to adjust for the variation among clinical centers. Univariate analyses were conducted to assess the relationship between chronic prostatitis symptoms and HRQOL, as well as predictors of scoring in the worst third of pain + urinary symptoms score. Multivariable linear models were used to develop separate predictive models for MCS and PCS scores using SAS Proc Mixed. Logistic regression modeling was used to predict scoring in the worst third of the NIH-CPSI symptom scale, using the SAS Proc Genmod. Each multivariable model was developed using forward selection among all potential predictor variables, including the comorbities, after first adjusting for age in each model. We ran random effects models to adjust all multivariable results for cluster effects among subjects within clinical centers.

RESULTS

Demographics

The baseline demographic characteristics of the 278 men in this report included a mean age of 42 (±11.7) years and a mean duration of chronic prostatitis of 6.5 (±7.4) years; the majority (86.7%) were white, educated beyond high school (88.4%), currently employed (83.1%), living with a partner (66.5%), and earning more than $50,000 USD per year (54.6%) (Table 1). Approximately one-third of men had a self-reported history (presently or in the past) of psychiatric disease and almost one-quarter of men had a history of musculoskeletal, rheumatologic, or connective tissue disease (Table 1).

Table 1. Baseline Demographic Characteristics and Self-reported Co-existing Medical Conditions of the CPC Study Population

	Overall (*N* = 278)
Age (baseline), y	42.4 ± 11.7
Duration of chronic prostatitis, y	6.5 ± 7.4
Race, *n* (%)	
White	241 (86.7)
Nonwhite	37 (13.3)
Education, *n* (%)	
≤HS	32 (11.5)
≤College	153 (54.9)
Grad/prof	93 (33.5)
Living status, *n* (%)	
Alone	93 (33.5)
Partnered	185 (66.5)
Employment, *n* (%)	
Employed	231 (83.1)
Unemployed	16 (5.8)
Retired	19 (6.8)
Disabled	12 (4.3)
Income U.S. equiv., $, *n* (%)	
≤50K	124 (45.4)
>50K	149 (54.6)
Self-reported history of disease, *n* (%)	
Allergies	161 (58.3)
Hematopoietic, lymphatic, or infectious	118 (45.4)
Neurologic	113 (41.4)
Psychiatric	83 (30.2)
Gastrointestinal	69 (25.4)
Musculoskeletal, rheumatologic or connective tissue	58 (21.8)
Dermatologic	42 (15.2)
Cardiovascular	27 (9.7)
Endocrine or metabolic	17 (6.3)

Sample size varies according to missing data rates for individual medical history questions (0.4% for cardiovascular disease; 6.5% for hematopoietic, lymphatic or infectious disease).

Relationship between Chronic Prostatitis Symptoms and Health-related Quality of Life

Generic HRQOL. Overall, the CPC subjects' mean SF-12 MCS scores were 44.0 (±9.8), and mean SF-12 PCS scores were 46.4 (±9.5). Both the MCS and PCS mean scores decreased with increasing chronic prostatitis symptom severity ($P < .001$) (Table 2). The unadjusted mean scores of the MCS were worse than those in the most severe subgroups of two other chronic conditions, congestive heart failure and diabetes mellitus. The unadjusted mean scores on the PCS were lower than those for the general U.S. male population (Table 2). In addition, the distribution of responses to the "General Health" question of the SF-12 (data not shown) revealed that men with severe symptoms were more likely to report only "fair" or "poor" health,

Table 2. Comparison of Medical Outcomes Study (MOS): SF-12 Physical and Mental Component Scores with Selected Populations[23] and Symptom Severity Subgroups*

Subgroup	Physical Component Score (PCS)†	Mental Component Score (MCS)†	Prostatitis Specific Quality-of-life Subscore from NIH-CPSI‡
General U.S. male population	51.2	50.7	
Most severe DM	41.0	51.0	
Most severe CHF	36.3	47.6	
Overall CPC study (*N* = 278)	46.4 ± 9.5	44.0 ± 9.8	7.7 ± 2.9
Mild symptoms (*N* = 48)	50.5 ± 8.6	48.9 ± 8.8	5.0 ± 2.8
Moderate symptoms (*N* = 132)	47.7 ± 8.9	45.1 ± 9.1	7.3 ± 2.4
Severe symptoms (*N* = 98)	42.5 ± 9.6	40.0 ± 9.8	9.6 ± 2.1

* *Mild (0 to 9), moderate (10 to 16), severe (17 to 31) subgroups for total symptom severity score (pain + urinary) formed to illustrate trends in quality-of-life scores.*
† *SF-12 MCS and PCS scores range from 0 to 100.*
‡ *NIH-CPSI QOL score ranges from 0 to 12.*
NIH-CPSI, National Institutes of Health Chronic Prostatitis Symptom Index; DM, diabetes mellitus; CHF, congestive heart failure; CPC, Chronic Prostatitis Cohort.

compared to men with mild or moderate symptoms (*P* value for trend <.001).

Condition-specific HRQOL. The relationship between chronic prostatitis symptoms and health-related quality of life, as measured by the QOL scale of the NIH-CPSI, also revealed a significant worsening of HRQOL with increasing symptom severity (Table 2).

Multivariable Analyses. Although univariate analyses revealed that men with more severe symptoms were more likely to have worse MCS scores, we adjusted for other variables that could be important predictors of MCS scores, including: age, race, living status, employment, education, income, duration of symptoms, SF-12 PCS, and comorbidity. Similarly, for predicting SF-12 PCS scores among men with chronic prostatitis, we included the same list of covariates; however, MCS was substituted for PCS. Within multivariable modeling of the variability of mental component scores, adjustment revealed that worse chronic prostatitis symptoms (coefficient −0.61; $P < .01$), a history of psychiatric disease (coefficient −5.63; $P < .01$), and younger age (coefficient 0.10; $P = .02$) were all significant independent predictors of worse MCS scores (Table 3). Similarly, within multivariable modeling of the variability of physical component scores, adjustment also revealed that worse chronic prostatitis symptoms (coefficient −0.66; $P < .01$) and a history of rheumatologic disease (coefficient −5.02; $P = .02$) were independent predictors of worse PCS scores (Table 4). Within the model for PCS, adjustment for age was also included, although it was not statistically significant ($P = .38$).

Predictors of Worse Chronic Prostatitis Symptoms

Since there was a strong relationship between worse chronic prostatitis symptoms and lower MCS and PCS scores, the factors that might predict having more severe symptoms of chronic prostatitis were examined. The same demographic, socioeconomic status (SES), and clinical covariates were used as in the preceding model, with the exceptions that: 1) the presence of chronic prostatitis symptoms in the worst third (scoring 17 or greater) of the distribution of the pain + urinary score were now the dependent variable; 2) the SF-12 MCS and PCS covariates were removed from consideration as predictor variables; and 3) the only comorbidities included were psychiatric and rheumatologic (these were the only diseases found significant in previous models). Within a multivariable logistic regression model adjusting for age, further adjustments revealed that less education and lower income were independent predictors of more severe (the worst third) chronic prostatitis symptoms at baseline, whereas a history of rheumatologic disease was associated with a lower probability of being scored in the worst third of the pain + urinary scale. In particular, there were 5-fold greater odds of having severe (worst third) symptoms in men with a high school education or less than in men with at least some postgraduate schooling, and 2-fold greater odds for men with income less than $50,000 USD having symptoms in the worst third compared to those with incomes of at least $50,000 USD. Men with a history of rheumatologic disease were one-half as likely to have severe symptoms as those who did not report having this condition now or in the past (Table 5).

Table 3. Predicting MOS SF-12: Mental Component Score Multivariable Model Results

Variable	Coefficient	Standard Error	*P* Value
Intercept	50.32	2.50	
Age	0.10	0.05	.0217
Pain + urinary score (higher)	−0.61	0.09	<.0001
History of psychiatric disease	−5.63	1.15	<.0001

MOS, medical outcomes study.

Table 4. Predicting MOS SF-12: Physical Component Score Multivariable Model Results

Variable	Coefficient	Standard Error	*P* Value
Intercept	59.13	2.51	
Age	−0.04	0.05	.3820
Pain + urinary score (higher)	−0.66	0.09	<.0001
History of musculoskeletal, rheumatologic, or connective tissue disease	−5.02	1.31	.0002

MOS, medical outcomes study.

Bacterial Localization

Twenty of the 278 men (7%) had cultures revealing bacterial localization, and 7 of these met criteria for bacterial prostatitis (Type II). The analyses were rerun excluding these 20 men, and the results did not change.

DISCUSSION

This prospective cohort study of a large number of men with chronic prostatitis recruited from several sites across North America is the first to use both the SF-12 (a generic health status measure) and the NIH-CPSI QOL subscale (a condition-specific health status measure) to assess HRQOL in this population. Our findings reveal that both the mental and physical domains of HRQOL are impaired, and that increased chronic prostatitis symptom severity is associated with worse HRQOL scores. Chronic prostatitis patients' mental health scores were worse than patients in the most severe subgroups of diabetes mellitus and congestive heart failure. The effect of chronic prostatitis symptoms on MCS and PCS scores remained significant after controlling for a number of potentially confounding factors. In addition to worsening chronic prostatitis symptoms, a history of psychiatric disease and younger age were strongly associated with worse MCS scores, and a history of rheumatologic disease was associated with worse PCS scores. The predictors of more severe symptom scores included lower educational level and lower income; history of rheumatic disease was associated with higher scores. Previous studies have documented an association between prostatitis and both psychiatric[24–27] and rheumatologic[28] diseases.

The impact of symptoms on HRQOL, as measured by the SF-12, has been examined in other chronic conditions. A recent study by Koloski et al.[29] described a profound impact of functional gastrointestinal disorders on HRQOL; the study population had a mean MCS = 43.9 and a mean PCS = 47.7. This level of HRQOL impairment is similar to the result we found in chronic prostatitis that revealed (overall) mean MCS = 44.0 and (overall) mean PCS = 46.5. Since mortality is not a concern in conditions such as chronic prostatitis or functional gastrointestinal diseases, HRQOL is an important endpoint when examining treatment effectiveness. However, since self-reports that depend on the interpretation of physical sensations can be influenced by depressive somatic symptoms, it is important to control for psychiatric disease. A recent study by Mancuso et al.[30] demonstrated that asthma patients with more depressive symptoms reported worse HRQOL than asthma patients with similar disease activity but fewer depressive symptoms.

Whether psychological factors may play a role in chronic prostatitis symptomatology has been previously examined. In one study, depression and a tendency to somaticize differentiated chronic prostatitis patients from controls,[25] and in another, men with chronic prostatitis consistently scored worse than controls on hypochondriasis, depression, hysteria, and somaticization scales.[26] Another study showed that over one-half of the patients with chronic prostatitis met criteria for depression[27]; since none had been diagnosed previously or was on medication for depression, this appears to be an underrecognized condition among men with chronic prostatitis and might complicate their treatment. Neither these prior studies nor our present report describe the psychological profile of patients before the onset of chronic prostatitis symptoms therefore, causality cannot be determined. Thus, it is unclear whether chronic prostatitis symptoms lead to psychiatric disease (i.e., depression) or whether psychiatric disease leads to worse chronic prostatitis symptoms. There was also a significant association between younger age and worse MCS scores. Our finding is consistent with other studies of patients with breast cancer[31] and veterans,[32] which have shown that younger patients have worse MCS scores.

We also found an association between history of rheumatologic disease and worse PCS scores. Since musculoskeletal conditions often result in physical disability, it follows that chronic prostatitis patients with these diseases might report worse physical health. Rheumatologic conditions have also been postulated to be predisposing or etiologic factors underlying chronic prostatitis; the suggested mechanism is an immunologic process.[33,34]

Table 5. Predicting the Worst Third of the NIH-CPSI Pain + Urinary Score Multivariable Model Results

Variable	Odds Ratio (95% Confidence Interval)	*P* Value
Age	0.99 (0.99 to 1.00)	.2719
Education		
≤HS	5.45 (4.40 to 6.75)	<.0001
≤College	1.05 (0.63 to 1.75)	
Grad/professional	1.0 (Reference)	
Income less than 50K U.S.	2.08 (1.43 to 3.03)	<.0001
History of musculoskeletal or rheumatologic disease	0.51 (0.40 to 0.65)	<.0001

NIH-CPSI, National Institutes of Health Chronic Prostatitis Symptom Index.

In an internet survey of men with chronic prostatitis, Alexander and Trissel found that 29% of subjects reported having had a history of rheumatologic disease[28]; this is comparable to our self-reported rate of 22%.

Socioeconomic status indicators, such as lower education and lower income, also played an important role in predicting which men would have worse chronic prostatitis symptoms. These findings are consistent with those found among women with interstitial cystitis; women with lower education and income in the Interstitial Cystitis Database were more likely to report more severe symptoms.[35] We also found that having a history of rheumatologic disease was associated with less severe symptoms. One potential reason for this finding might be that subjects with rheumatologic disease are taking anti-inflammatory agents that might mitigate the severity of chronic prostatitis symptoms. However, we did not collect information on medication use for rheumatologic disease and thus cannot address this possibility. An NIH/NIDDK-sponsored randomized, controlled trial is currently underway to determine the effectiveness of anti-inflammatory agents in treating chronic prostatitis.

Our study has several limitations. First, the temporal relationship between chronic prostatitis and HRQOL is not known; since this was a cross-sectional analysis, directionality or causal inferences between chronic prostatitis and HRQOL cannot be drawn. Second, many men in the cohort were recruited from tertiary care centers, and selection bias may have resulted in men in the cohort having more severe disease than those men who might have been drawn from the general population. Third, the population is primarily well educated white men; results may not be generalizable to other racial and ethnic groups and men with lower education and SES. However, data should be forthcoming on the generalizability issue, because the NIH-CPSI is currently being used in studies among more diverse populations of chronic prostatitis patients, and the instrument has been translated for use in populations who speak Spanish, Korean, or German. Finally, we did not include a screen for depression or musculoskeletal symptoms, but rather a self-report of having had a history of psychiatric or rheumatologic disease. Whether a patient in our cohort with chronic prostatitis had active depressive or musculoskeletal symptoms or a remote history of them could make a difference in the impact on their self reported symptoms and HRQOL.

In conclusion, this study shows that generic (both the mental and physical domains) and condition-specific HRQOL are impaired in men with chronic prostatitis; the worse the symptoms, the worse the HRQOL. Clinicians should consider administering HRQOL instruments to their patients with symptoms suggestive of chronic prostatitis to better understand the impact of the condition on their patients' lives. Since assessment and management of chronic prostatitis might be complicated by concurrent psychiatric illness (i.e., depression) or musculoskeletal disease, it might be prudent for future studies of chronic prostatitis to at least include validated depression and musculoskeletal scales for comprehensively assessing outcomes.

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APPENDIX

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