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Original Article

Symptoms, sexual dysfunction and psychological burden in Chinese men with chronic prostatitis/chronic pelvic pain syndrome

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Abstract: The etiology of chronic prostatitis/chronic pelvic pain syndrome (CP/CPPS) is unknown, which might associate with substantial morbidity and a greatly reduced quality of life (QOL), and significant healthcare cost. In this study, we investigated the symptoms, psychological burden and sexual dysfunction in men with chronic prostatitis/chronic pelvic pain syndrome. A cross-sectional and multicenter survey was conducted from July 2012 to January 2014. Male participants were recruited from urology clinics in five cities in China. Patients were asked to participate the survey by completing a verbal questionnaire, which consisted of social-demographics, sexual history, expressed prostatic secretions evaluation and score of the National Institute of Health Chronic Prostatitis Symptom Index (NIH-CPSI). Finally, a total of 1,280 men completed the survey. The incidences of CP/CPPS type III a and III b in men with CP/CPPS (N=801) were 31.71% and 68.29%, respectively. Significantly differences on NIH-CPSI scores, and the incidence of psychological burden and sexual dysfunction were observed between CP/CPPS and control groups. Similarly, men with the CP/CPPS type III a vs. type III b reported higher scores of NIH-CPSI, and higher incidence of psychological burden and sexual dysfunction (P<0.001 for all). Logistic regression analyses showed that CP/CPPS was significantly associated with NIH-CPSI scores, including total scores >20, pain symptoms >10, urinary symptoms and QOL impact. In addition, CP/CPPS associated with psychological burden (Anxiety; Depression; Loss of sleep; Decline in memory and sexual dysfunction (PE; ED; Decline in sexual desire). In conclusion, CP/CPPS was significantly associated with NIH-CPSI, psychological burden and sexual dysfunction.

Keywords: Symptoms, sexual dysfunction, psychological burden, chronic prostatitis/chronic pelvic pain syndrome

Introduction

The National Institutes of Health (NIH) classified prostatitis into 4 main categories: 1) Acute bacterial; 2) Chronic bacterial; 3) Chronic prostatitis/Chronic pelvic pain syndrome (CP/CPPS); 4) Asymptomatic inflammatory [1]. CP/CPPS is the most frequent and debilitating prostate-related complaint in men, affecting between 4 and 16% of men during their lifetime [2] and comprising more than 90% of cases of CP [3]. However, the etiology of CP/CPPS is unknown, which might associated with undiagnosed genitourinary tract infections, idiopathic neuralgia, abnormal pelvic floor muscle tone, psychological stress and genetic polymorphisms affecting signaling via the androgen receptor [4]. In addition, findings from previous studies have shown that CPPS might cause substantial morbidity (e.g., sexual dysfunction, negatively psychological effects) and a greatly reduced quality of life (QOL), and significant healthcare cost [5, 6].

In a large observational study conducted by Bartoletti *et* al. [7], men with CPPS reported higher total and subdomain scores of the National Institute of Health Chronic Prostatitis Symptom Index (NIH-CPSI) than men without

CPPS. In addition, CPPS had a negative influence on sexual desire, erectile dysfunction [ED] and premature ejaculation [PE]. The incidence of ED and PE in CPPS groups was 27.49% and 8.38%, whereas those in control group were 0.00% and 7.89%. In addition, a 2008 study by Lee *et* al. [8] investigated the prevalence of sexual dysfunction (including self-reported ED, ejaculatory difficulty, or both) among a population of 296 Malaysian men presenting to general urology clinic with CP/CPPS. They found that 72.3% of participants had self-reported sexual dysfunction (25.0% complained of ED only, 33.4% had ejaculatory difficulties only, while 41.6% experienced both). Moreover, compared with men without sexual dysfunction, men with any element of sexual dysfunction reported worse CP/CPPS symptoms and worse quality of life. Relationships between sexual dysfunction and CP/CPPS have been suggested in their study.

For the negatively psychological impacts, Anderson *et* al. [9] found that men with CP/CPPS might reported more perceived stress and anxiety than control. Particularly, Brief Symptom Index scores were significantly increased in all scales (e.g., depression, anxiety, hostility and interpersonal sensitivity) for chronic pelvic pain syndrome, and Global Severity Index rank for chronic pelvic pain syndrome was 93rd *vs.* 48th percentile for controls. In addition, another study [10] presented the potential relationships between NIH-CPSI and psychological impacts. Before and after treatment, the change in NIH-CPSI total score was significantly higher in those without depression than in those with depression (Before treatment 18.5 *vs.* 22.2; After treatment 15.5 *vs.* 22.0).

In this study, we tended to assess the pelvic pain, and the incidence of sexual dysfunction, psychological impact and semen quality in CP/CPPS, and then investigated their possible association in Chinese men.

Materials and methods

Subjects

An observational, cross-sectional and multicenter survey was conducted from July 2012 to January 2014. Based on the stratified sampling, several different provinces/cities, including Beijing, Guangzhou, Hubei, Shanxi and Anhui, were selected randomly to represent the northern, southern, middle, western and eastern parts of China. Male participants were recruited from urology clinics which were located at the above provinces/cities. This study were evaluated and approved by the Anhui Medical University Research Subject Review Board.

Study design and procedure

Prior to study enrollment, all participants were informed about this survey. Eligible patients were asked to provide written consent. In addition, a pre-survey was given to a small sample of subjects to modify the original designed items to ensure that the questionnaire was comprehensive and easily understood.

All men participated the survey by completing a verbal questionnaire, which consisted of sociodemographics (e.g., weight, height, age, marital status and education level), past medical history, sexual history, expressed prostatic secretions evaluation and score of the Chinese version of the NIH-CPSI.

Assessment of NIH-CPSI is a reliable, convenient, self-administered index that is widely used across scientific research and clinical studies (including pain symptoms [total of items 1-4], urinary symptoms [total of items 5 and 6] and Quality of life [QOL] impact [total of items 7-9]). The Chinese version of NIH-CPSI was widely used in the previous studies in China. Based on the total of items 1-9, the severity of CPPS was classified as mild (10-14 points), moderate (15-29 points) or severe (>30 points).

The definition of CP/CPPS was used as described in the NIH consensus [1]. CP/CPPS patients were divided into two groups: patients with >10 leukocytes per high-power field as inflamed CPPS (category III a) and patients with <10 leukocytes per high-power field as non-inflamed CPPS (category III b).

Statistical analysis

Data analyses were carried out with SPSS version 13.0 software (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used to summarize the characteristics of the subjects. Data were expressed as the mean ± standard deviation or number (percentage) when appropriate. Chi-square test and one-way ANOVA were used

Table 1. Demographic information of men in the CP/CPPS (Types III a and III b) and control groups

Characteristics	All subjects (N=1280)		CP/CPPS						Control (N=479)		P^B
			All (N=801)		Type III a (N=254)		Type III b (N=547)		P^A			
Age (years)												
Mean ± SD (range)	34.50 ± 9.20 (19-56)		34.90 ± 9.43 (19-59)		34.88 ± 9.03 (19-59)		34.91 ± 10.01 (20-55)		*0.512*	33.84 ± 9.24 (22-56)		*0.814*
BMI (kg/m^2)												
Mean ± SD (range)	24.36 ± 1.70 (20.65-27.43)		24.20 ± 1.68 (21.17-27.43)		24.32 ± 1.56 (21.17-26.84)		24.15 ± 1.74 (22.02-27.43)		*0.742*	24.64 ± 1.82 (20.65-26.72)		*0.628*
Duration of symptoms (month)												
Mean ± SD (range)	N/A		12.05 ± 18.74 (0.5-120)		12.86 ± 18.45 (0.5-120)		11.68 ± 19.21 (1-118)		*0.285*	N/A		N/A
Marital status (n%)									*0.847*			*0.962*
Single	233	18.20%	150	18.73%	45	17.72%	105	19.20%		83	17.33%	
Married	834	65.16%	519	64.79%	168	66.14%	351	64.17%		315	65.76%	
Separate or divorced	213	16.64%	132	16.48%	41	16.14%	91	16.64%		81	16.91%	
Educational status (n%)									*0.729*			*0.828*
Primary school	536	41.88%	337	42.07%	103	40.55%	234	42.78%		199	41.54%	
High school	415	32.42%	257	32.08%	81	31.89%	176	32.18%		158	32.99%	
University graduate	329	25.70%	207	25.84%	70	27.56%	137	25.05%		122	25.47%	
Occupational status (n%)									*0.162*			*0.906*
Student	114	8.91%	72	8.99%	22	8.66%	50	9.14%		42	8.77%	
Unemployed	70	5.47%	41	5.12%	17	6.69%	24	4.39%		29	6.05%	
Employed	1040	81.25%	655	81.77%	200	78.74%	455	83.18%		385	80.38%	
Retired	56	4.38%	33	4.12%	15	5.91%	18	3.29%		23	4.80%	

CP/CPPS = Chronic prostatitis/chronic pelvic pain syndrome; N/A = Not Applicable; P^A: Difference between Type III a and III b groups; P^B: Difference between CP/CPPS and control groups. $P<0.05$ was considered statistically significant.

Table 2. Outcomes of NIH-CPSI and presence of comorbidities in CP/CPPS and control groups

Characteristics	All subjects (N=1280)	CP/CPPS				Control (N=479)		P^B
		All (N=801)	Type III a (N=254)	Type III b (N=547)	P^A			
NIH-CPSI								
Total scores	20.25 ± 6.52	31.23 ± 9.86	35.16 ± 10.62	29.41 ± 9.24	*<0.001*	1.89 ± 1.17		*<0.001*
Pain symptoms	10.49 ± 4.47	16.34 ± 5.25	18.15 ± 5.64	15.5 ± 5.12	*<0.001*	0.72 ± 0.25		*<0.001*
Urinary symptoms	5.27 ± 2.18	8.03 ± 3.13	9.73 ± 3.56	7.24 ± 2.97	*<0.001*	0.65 ± 0.33		*<0.001*
Quality of life impact	4.49 ± 1.92	6.86 ± 2.24	7.28 ± 2.55	6.67 ± 2.32	*<0.001*	0.52 ± 0.19		*<0.001*
Psychological burden								
Anxiety	267 20.86%	260 32.46%	101 39.76%	159 29.07%	*<0.001*	7	1.46%	*<0.001*
Depression	141 11.02%	136 16.98%	70 27.56%	66 12.07%	*<0.001*	5	1.04%	*<0.001*
Loss of sleep	154 12.03%	143 17.85%	8 3.15%	135 24.68%	*<0.001*	11	2.30%	*<0.001*
Decline in memory	232 18.13%	211 26.34%	85 33.46%	126 23.03%	*<0.001*	21	4.38%	*<0.001*
Sexual dysfunction								
PE	234 18.28%	227 28.34%	105 41.34%	122 22.30%	*<0.001*	7	1.46%	*<0.001*
ED	110 8.59%	104 12.98%	51 20.08%	53 9.69%	*<0.001*	6	1.25%	*<0.001*
Decline in sexual desire	264 20.63%	252 31.46%	131 51.57%	121 22.12%	*<0.001*	12	2.51%	*<0.001*

NIH-CPSI = National Institute of Health Chronic Prostatitis Symptoms Index; CP/CPPS = Chronic Prostatitis/Chronic Pelvic Pain Syndrome; PE = Premature Ejaculation; ED = Erectile Dysfunction; P^A: Difference between Type III a and III b groups; P^B: Difference between CP/CPPS and control groups. $P<0.05$ was considered statistically significant.

for intergroup comparisons. In addition, logistic regression was used to evaluate the associated factors of CP/CPPS. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated to examine association strength. For all tests, $P<0.05$ was considered statistically significant.

Results

Demographic information

Finally, of 1,672 men who met the inclusion criteria, a total of 1,280 men completed the survey, with a response rate of 76.56%. Their mean age and BMI scores were 34.50 ± 9.20 years and 24.36 ± 1.70 kg/m^2, respectively. Based on the CP/CPPS definition, 801 men were diagnosed as having CP/CPPS. The incidence of type III a and III b in men with CP/CPPS were 31.71% and 68.29%, respectively. There was no significantly difference between CP/CPPS and control groups, with respect to age, BMI score, marital status, educational status and occupational status. Similarly, no significantly difference for the above demographic information was also found between the type III a and III b groups. Detail demographic characteristics for all subjects are summarized in **Table 1**.

NIH-CPSI, psychological burden and sexual dysfunction in CP/CPPS and control groups

Based on the outcomes of NIH-CPSI, psychological burden and sexual dysfunction, significantly differences were observed among men between CP/CPPS and control groups ($P<0.001$ for all) (**Table 2**). For the total and subdomain (e.g., item of *pain, urinary symptoms, or QOL impact*) of NIH-CPSI, their mean scores in men with CP/CPPS were higher than those in men without CP/CPPS. In addition, men with CP/CPPS reported higher rates of psychological burden (e.g., anxiety [32.46% *vs.* 1.46%] and depression [16.98 *vs.* 1.04]) than men without CP/CPPS. For the incidence of sexual dysfunction (including PE, ED and decline in sexual desire), those in CP/CPPS groups were also reported significantly higher than control group. The incidence of PE, ED and decline in sexual desire in men with CP/CPPS were 28.34%, 12.98% and 31.46%, whereas those in men without CP/CPPS were 1.46%, 1.25% and 2.51%, respectively. Similarly, when compared with men with type III b CP/CPPS, men with the type III a CP/CPPS reported higher scores of NIH-CPSI, and higher incidence of psychological burden and sexual dysfunction ($P<0.001$ for all).

Logistic regression analyses of associated factors for CP/CPPS

In logistic regression analyses model (**Table 3**), we found that CP/CPPS was significantly associated with total and subdomain scores of NIH-CPSI, including *total scores* >20 (OR: 3.82, CI: 2.21 -4.25), *pain symptoms* >10 (OR: 3.89, CI: 3.15-5.48), *urinary symptoms* (OR: 3.15, CI: 2.96-4.07) and *QOL impact* (OR: 2.54, CI: 1.82-

Table 3. Multivariate logistic regression analyses of associated factors for CP/CPPS

	Odds Ratios	95% Confidence Intervals	*P value*
NIH-CPSI			
Total scores <20	1		
Total scores >20	3.82	2.21-4.25	*0.002*
Pain symptoms <10	1		
Pain symptoms >10	3.89	3.15-5.48	*<0.001*
Urinary symptoms <5	1		
Urinary symptoms >5	3.15	2.96-4.07	*<0.001*
Quality of life impact <4	1		
Quality of life impact >4	2.54	1.82-2.88	*0.013*
Psychological burden			
Anxiety			
No	1		
Yes	2.24	1.57-2.69	*<0.001*
Depression			
No	1		
Yes	2.04	1.33-2.71	*<0.001*
Loss of sleep			
No	1		
Yes	1.56	1.03-3.35	*0.026*
Decline in memory			
No			
Yes	1.87	1.45-2.36	*0.013*
Sexual dysfunction			
PE			
No	1		
Yes	2.13	1.25-3.67	*<0.001*
ED			
No	1		
Yes	1.85	1.38-3.32	*0.006*
Decline in sexual desire			
No	1		
Yes	1.64	1.27-3.25	*0.012*

Total scores of NIH-CPSI, pain symptoms, urinary symptoms and quality of life impact were categorized as *Total scores* ≥20 vs. *Total scores* <20, *Pain symptoms scores* ≥10 vs. *Pain symptoms scores* <10, *Urinary symptoms scores* ≥5 vs. *Urinary symptoms scores* <5, *Quality of life impact scores* ≥4 vs. *Quality of life impact* <4, respectively. NIH-CPSI = National Institute of Health Chronic Prostatitis Symptoms Index; CP/CPPS = Chronic Prostatitis/Chronic Pelvic Pain Syndrome; PE = Premature Ejaculation; ED = Erectile Dysfunction. *P*<0.05 was considered statistically significant.

2.88). In addition, our results showed the association between CP/CPPS and psychological burden (Anxiety: [OR: 2.24, CI: 1.57-2.69]; Depression: [OR: 2.04, CI: 1.33-2.71]; Loss of sleep: [OR: 1.56, CI: 1.03-3.35]; Decline in memory: [OR: 1.87, CI: 1.45-2.36]), and sexual dysfunction (PE: [OR: 2.13, CI: 1.25-3.67]; ED: [OR: 1.85-1.38-3.32]; Decline in sexual desire:[OR: 1.64, CI: 1.27-3.25]).

Discussion

Currently, CP/CPPS was suggested the most common and debilitating prostatitis syndromes. For the one hand, the prevalence of CP/CPPS was higher than other types of CP symptoms. In addition, because of its complex factors and mechanisms, the antilogy of CP/CPPS remains unclear with various theories. Findings from previous studies at home and aboard mainly focus on the effects of CP/CPPS on patients' psychical and psychological status, and their QOL, including the various degree of urogenital pains or discomfort, frequent urination symptoms, and decline in sexual function and semen quality. Moreover, the NIH-CPSI, as a formally instrument for the evaluation of CP/CPPS symptoms, contains 13 items that are scored in three discrete domains: pain, urinary symptoms, and the impact on QOL. It provided a valid assessment tool and outcome measure in the management of CP/CPPS. Therefore, through assessing the related factors in patients with CP/CPPS, we tended to discuss the relationships between CP/CPPS and physical symptoms, mental status and sexual situations.

Results from our study showed that CP/CPPS was significantly associated with NIH-CPSI (e.g., total and subdomain scores), psychological burden (e.g., anxiety and depression) and sexual dysfunction (e.g., PE and ED). Men with CP/CPPS reported a higher score of NIH-CPSI (including total and subdomain of NIH-CPSI) than men without CP/CPPS. In addition, the incidence of sexual dysfunction and psychological burden in CP/CPPS groups were higher than those in control group. In addition, when compared with men with type III b CP/CPPS, men with the type III a CP/CPPS reported higher scores of NIH-CPSI, and higher incidence of psychological burden and sexual dysfunction. Because the main dis-

tinction between CP/CPPS III a and III b lies on leukocytes >10 or not per high-power field, the inflammation might be an important factor for the effects of CP/CPPS on patients' physical and psychological status, and sexual function.

For the NIH-CPSI in men with CP/CPPS, Wagenlehner *et* al. [11] found that perineal pain discomfort was the most prevalent pain symptoms (63%) followed by testicular pain (58%), pain in the public area (42%) and penis (32%). The severity of pain was significantly correlated well with frequency of pain (r=0.645). Correlation of pain domain with QOL (r=0.678) was higher than the urinary domain (r=0.320). Pain severity (r=0.627) and pain frequency (r=0.594) correlated better with QOL than pain localization (r=0.354). Thence, the above findings showed that pain has more impact on QOL than urinary symptoms, and pain severity and frequency are more important than pain location/type. In another prospective study, Propert *et* al. [12] found that the improvement on mean NIH-CPSI scores among the 293 males occurred in the first 3 months of follow up. However, in the rest of follow-up, their mean symptoms scores were stable and improved slightly over time. Similar findings that the higher NIH-CPSI scores in CP/CPPS were also observed in our study. In addition, we also found that the association between pain symptoms and NIH-CPSI (OR=3.82) were stronger than other domain of NIH-CPSI. Therefore, we speculated that pain domain might be a major symptom in CP/CPPS, and provided important tips on the diagnosed of CP/CPPS.

Previous studies have shown the negative effects of CP/CPPS on psychological status and sexual function [13-15]. Most evidences have suggested that psychological factors are important in understanding CP/CPPS. Data from Ahn *et* al. study [15] presented that the anxiety and depression domain of the hospital anxiety and depression scale showed significantly differences between CP/CPPS and control groups. The CP/CPPS patients had depression, anxiety, and higher perception of stress. In particular, these were closely related to the pain and quality of life of the patients. Another study conducted by Chung [16] showed that CP/CPPS was associated with anxiety disorder. For the sexual dysfunction in CP/CPPS, Tran and Shoskes [14] suggested that men with CP/CPPS were significantly more likely to experience ED, ejaculatory pain and PE compared to the general population. However, Lee *et* al. [8] evaluated the adverse impact of sexual dysfunction in CP/CPPS. Compared to the patients with CP/CPPS, patients with CP/CPPS and sexual dysfunction experienced substantially worse symptoms, particularly worse quality of life. Sexual dysfunction considered an important aspect of CP/CPPS. Our results confirmed the above findings. Significantly relationships between CP/CPPS and sexual dysfunction, and psychological burden were also observed in our study. Because psychological status have been proved to affect males sexual function [17-20], we speculated that there also exited a link between sexual function and psychological status in men with CP/CPPS.

Our study provides a framework for understanding the relationships between CP/CPPS and NIH-CPSI scores, psychological burden and sexual dysfunction. However, several limitations should also be considered. First, face to face interviews may cause embarrassment when sensitive personal issues are at issue. Respondents may feel obliged to give socially acceptable answers during face to face interviews. Hence, other methods, e.g. internet-based survey, can be used in further survey. Second, because there were some potential association among NIH-CPSI scores, psychological burden and sexual dysfunction, they might be considered in the process of investigating the effects of CP/CPPS. Finally, further in-depth studies are needed to confirm and extend these results.

Conclusions

Our study assessed the pelvic pain, and the incidence of sexual dysfunction, psychological impact and semen quality in CP/CPPS, and investigated their possible association in Chinese men. We found that CP/CPPS was significantly associated with NIH-CPSI, psychological burden and sexual dysfunction.

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Disclosure of conflict of interest

None.

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