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Sexual dysfunctions and psychological disorders associated with type IIIa chronic prostatitis: a clinical survey in China

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Abstract
Introduction Chronic prostatitis (CP) is a frequent prostate-related complaint, impacts negatively on quality of life and is mostly of unclear etiology. Increasing attention has been paid to the prevalence of sexual dysfunctions in CP patients; however, the impact of specific types of CP and the correlation of sexual dysfunctions with psychological disorders associated with CP are not well understood. Type IIIa CP is characterized by chronic pelvic pain, urination symptoms and white blood cells in expressed prostatic secretion, but free of bacterial infection.
Methods A population of 600 type IIIa CP patients were randomly selected and 40 normal man were included as the control group. Queries were conducted by urologists. The National Institute of Health Chronic Prostatitis Symptom Index (NIH-CPSI), the International Index of Erectile Function (IIEF-5) and the Symptom Checklist 90-R were used to evaluate the symptoms and severity of prostatitis, erectile dysfunctions and psychological problems, respectively. Scores of ejaculatory pain and premature ejaculation were also collected.
Results Our study revealed that sexual dysfunctions are frequently associated with this specific type of CP. The prevalence of erectile dysfunction, premature ejaculation and ejaculatory pain was 19, 30 and 30 %, respectively. A variety of psychological problems exist among type IIIa CP patients, including depression, anxiety, somatization, obsessive–compulsive and interpersonal sensitivity. In particular, the severity of erectile dysfunctions, but not premature ejaculation and ejaculatory pain, correlated significantly with depression and anxiety.
Conclusion Our data indicate that a moderate level of sexual dysfunctions exists among the type IIIa CP patients, and highlight the association of depression and anxiety with erectile dysfunction in CP patients, suggestting that special attention should be paid to these psychological issues in clinical treatments of the prostatitis symptoms and the associated erectile dysfunctions.

Keywords Type IIIA chronic prostatitis · Sexual dysfunctions · Erectile dysfunction · Premature ejaculation · Psychological problems · Depression · Anxiety

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Introduction

Prostatitis is categorized into four types according to the symptoms, duration and bacterial infection. Type I is an acute bacterial infection, with systemic symptoms, such as

fever, and is curable with strong antibiotics. Type II is a chronic bacterial infection of the prostate. Type III, also referred to as Chronic Pelvic Pain Syndrome (CPPS), is defined as persistent discomfort or pain in the pelvic region with sterile specimen cultures and accounts for 90 % of all prostatitis, and afflicting 5–15 % of men worldwide [1, 2]. It is further categorized into IIIA and IIIB, of which Type IIIA refers to inflammatory CP with the presence of white blood cells (WBC) in semen, after a prostate massage urine specimen (VB3) or expressed prostatic secretion (EPS). Type IV is characterized by inflammation of the prostate, but has no clinical symptoms and is not generally of concern [3–6].

In recent years, there is a growing body of the literature suggesting the adverse impact of CP/CPPS on sexual functions [2, 7–20]. Men with CP/CPPS are more likely to experience erectile dysfunction (ED), ejaculatory pain (EP) and premature ejaculation (PE) compared to the general population. However, for the inconsistent measurement and varying methods of sampling, the reported prevalence of sexual dysfunctions varies greatly. For example, the erectile dysfunction ranges from 0.6 % [21] to 48.3 % [10] among different investigations. Similarly, reported PE prevalence rates vary widely, ranging from 26.2 % [12] to 77.3 % [8].

The existing reports regarding the impact of ejaculatory pain on quality of life are inconsistent. One study showed that patients with CP and persistent ejaculatory pain had more severe symptoms of CP, are less likely to improve with time and have differences in demographic and sexual history compared to other patients with CPPS [18], while another study showed that ejaculation could relieve pelvic pain in a small number of men with CP [22].

Ratios of ED and PE may also vary with different types of prostatitis. For instance, when CP/CPPS was measured as infection, the lowest prevalence of PE was 47.8 % [16, 23]. These studies examined prostate pathology in men with PE, even if no complaints of pain or urinary dysfunction. It is suggested that inflammation may adversely affect ejaculation even in the absence of pain. In another study by Sonmez et al. [20], the overall sexual dysfunctions differed significantly between type IIIA and IIIb. Nevertheless, the interpretation of these results is limited with the small sample size in this study.

The prevalence of ED and PE in Chinese men with CP has been reported previously [9, 11, 12]. These studies revealed a moderate rate of ED and PE among the Chinese CP patients, and rates of ED differed significantly between the self-reported results and those assessed by the IIEF5. However, a number of issues remain to be addressed, such as ejaculatory pain, the specific types of prostatitis and the impact of psychosocial factors. Therefore, we conducted the current study to investigate the impact of the mostly occurred CP, Type IIIA, on sexual functions, and analyzed the influence of various psychosocial factors.

Materials and methods

The study was conducted in accordance with a protocol approved by the Ethics Committee of Guangzhou Medical University Research Subject Review Board. The investigations were conducted by urologists. Patients were introduced of the significance and content of the investigation. All patients provided written informed consent. The questionnaire consisted of age, profession, education, marriage, disease history, family history of diseases, duration of the current symptoms, scores of the Chinese version of the National Institute of Health Chronic Prostatitis Symptom Index (NIH-CPSI) and International Index of Erectile Function (IIEF5-5), ejaculatory pain, premature ejaculation and psychological symptoms such as depression and anxiety.

Participants

Chronic prostatitis (CP) patients seeking treatments were randomly selected from multiple clinics in the districts of Tianhe and Huangpu, Guangzhou City. There were a total of 600 CP patients of 18–50 year old by the diagnostic criteria of National Institute of Health chronic prostatitis symptom index (NIH-CPSI). Subjects with a score of <5 were considered normal and not included in the patients group. Symptoms were divided into mild, moderate and severe, corresponding to CPSI scores of 1–14, 15–30 and 31–43, respectively. The patients had NIH-CPSI score of higher than 5 and had symptoms of CP for more than 3 months. The pre- and postmassage test (PPMT) was carried out to determine the bacterial infection and inflammation [24, 25]. Type IIIA CP patients are defined when more than ten WBC are detected in the expressed prostate secretion (EPS) and are free of bacterial infection. Patients were excluded if they have the following disease conditions or a history: lower urinary tract infections, tuberculosis, stones, benign prostatic hyperplasia, urethral stricture, neurogenic bladder, prostate cancer, mental illness and diabetes, peripheral vascular disease, spinal cord injury, hypertension, coronary heart disease and other diseases affect sexual function. All patients have not taken any medication affecting sexual function within the past half year. The control participants were 40 normal male volunteers of 18–46 years old, with normal routine urinalysis, and the score of NIH-SCPSI was <5.

Premature ejaculation are characterized as ejaculation occurs before or within 2 min of intra-vaginal penetration, and the inability to delay ejaculation on all or nearly all

vaginal penetrations, but without other physical or psychological causes as distress, or the desire to avoid sexual intimacy. Erectile dysfunction were assessed by the criteria of IIEF-5, the scores of 12–21, 8–11 and 5–7 are defined as mild, moderate and severe ED, respectively.

Psychological problems-symptom checklist 90-R

The Symptom Checklist-90-R (SCL-90-R) is a relatively brief self-report psychometric instrument (questionnaire) published by the Clinical Assessment division of the Pearson Assessment & Information group [26, 27]. It is designed to evaluate a broad range of psychological problems and symptoms of psychopathology. It consists of 90 items and yields nine scores along primary symptom dimensions and three scores among global distress indices. The primary symptom dimensions that are assessed are somatization, obsessive–compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, psychoticism and a category of "additional items," which helps clinicians assess other aspect of the clients symptoms.

Statistical analysis

Descriptive analysis was performed for all the variables. Comparison of categorical variables between the control and CPPS groups was conducted using a Chi-square test, whereas comparison of continuous variables used *t* test for means.

SPSS for Windows 10.0 statistical program was used for all data analyses. ANOVA Student's *t* test, Mann–Whitney *U* test, Fisher's exact test and Chi-square test were used for statistical significance test, and $P < 0.05$ was considered significant in single-factor correlation.

Results

Comparison of the symptoms between CP and normal controls

There is no significant difference in the age of the two groups. The average score of NIH-CPSI was 18.0 ± 6.67 for the 600 CP patients, implicating severe CP symptoms. Pain index, urination problems, premature ejaculation and the score of IIEF-5 of the CP patients are all significantly different from those of the control group (Table 1). These results indicate that CP imposed significant adverse impact on the sexual functions.

Classification of sexual dysfunctions

Of the 600 CP patients, 180 (30 %) reported ejaculatory pain, while no ejaculatory pain was reported in the control group. Scores of IIEF-5 were categorized into 3 groups, which are 12–21, 8–11 and 5–7 for mild, moderate and severe ED, respectively. There were 116 patients (19 %) who had mild to severe erectile dysfunctions, among them 88 (15 %), 24 (4 %) and 4 (0.6 %) had mild, moderate and severe ED, respectively. According to the mostly accepted cutoff time of 2 min of intravaginal time, 180 patients (30 %) had premature ejaculation. However, the cutoff time of 2 min had been questioned, and it was suggested that a continuous measurement should be adopted. There were 160 CP patients (26.7 %), but no normal control men, who reported an intravaginal time of 3 min. Thus, an intravaginal time of 3 min may be at the margin of premature ejaculation. Accordingly, the actual rate of premature ejaculation could be much higher than 30 %, reaching 56.7 % with a cutoff time of 3 min. In addition, there were 35, 56 and 23 patients who had simultaneous sexual dysfunctions of PE and EP (5.8 %), ED and PE (9.3 %), and ED and EP (3.8 %). Thus, there were a total of 114 patients who had two concurrent symptoms of sexual dysfunctions (based on the conventional 2 min cutoff time for PE). No sexual dysfunction was reported from the control group. Comparison of the sexual dysfunctions between CP patients and control group was analyzed by Chi-square, and there was significantly difference between the two groups in all three variables ($P < 0.05$ for ED; $P < 0.001$ for EP and PE) (Table 2).

The distribution of ED with age significantly differed among the three groups (mild, moderate and sever) ED (Chi-square test $\chi^2 = 10.11$, $P < 0.01$). The median ages of the three groups were 29 (mild ED), 26 (moderate) and 26 (severe). Thus, severe and moderate EDs were more frequently seen in younger age. Figure 1 shows the scattered distribution of erectile dysfunctions with age. The ratios of ED in the 20–30 and 30–40 year group were significantly higher than those in the 40–50 year group (Fig. 1).

We analyzed the correlations between pairs of the individual variables, including NIH-CPSI score, urination

Table 1 Comparison of NIH-CPSI score, pain index, voiding symptoms and premature ejaculation (PE) between the CP patients and controls

Variables	Group		*P*
	CP	Control	
Age	28.95 ± 4.982	27.6 ± 3.85	0.56
NIH-CPSI	18.0 ± 6.67	0.7 ± 0.82	0
Pain index	7.35 ± 9.23	0.4 ± 0.84	0.019
Urination	3.99 ± 3.00	0.3 ± 0.48	0
PE (min)	3.30 ± 1.31	4.5 ± 1.58	0.006
IIEF-5	19.27 ± 5.32	23.8 ± 1.22	0.009

Statistical significance was analyzed by independent sample *t* test between the two groups. Values are expressed as mean ± SD. A value of $P < 0.05$ is considered to be statistically significant

Table 2 Classification of the sexual dysfunctions

Variables	Scores	CP patients		Controls		χ^2	P
		Number	%	Number	%		
EP	0	420	70	40	100	16.696	0
	1	180	30	0	0		
	22–25	484	81	40	100		
IIEF-5 score	12–21	88	15	0	0	9.445	0.024
	8–11	24	4	0	0		
	5–7	4	0.6	0	0		
PE (min)	1	56	9.3	0	0	122.86	0
	2	124	20.7	0	0		
	3	160	26.7	0	0		
	4	104	17.3	20	50		
	5 and up	156	26	20	50		

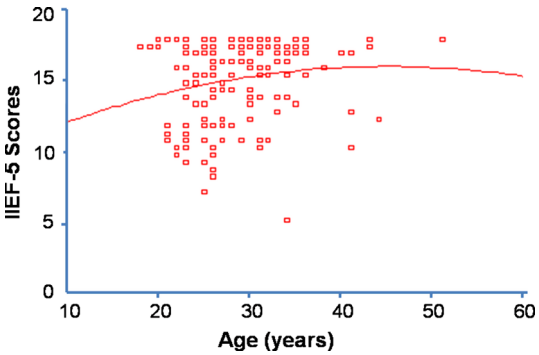

Fig. 1 Scattered distribution of erectile dysfunctions (IIEF-5 scores) with age. The median ages of the three groups were 29 (mild ED), 26 (moderate) and 26 (severe). The ratios of ED in the 20–30 and 30–40 year group were significantly higher than those in the 40–50 year group ($P < 0.01$)

problems, pain index, score of IIEF-5 and PE. The results show that there were significant correlations between NIH-CPSI and IIEF-5 scores ($P < 0.01$), and between EP and ED scores ($P < 0.01$). There was no significant correlation between NIH-CPSI and PE, pain index and ED/PE, urination and ED/PE, EP and PE (Table 3). These data suggest that the severity of the CP symptoms correlated significantly with that of ED, but not PE and EP, regardless of the facts that there was high prevalence of PE and EP in CP patients. The correlation of EP and ED suggests that there may be reciprocal influences between these two sexual dysfunctions.

Comparison of the symptom checklist 90-R scores between CP patients and controls

Among the nine primary symptoms yielded by the evaluation of the 90 items of SCL-90-R, there were five of which the scores were significantly different between the CP patients and controls, including somatization, obsessive–compulsive, interpersonal sensitivity, depression and anxiety. The total scores and the scores of the additional items also significantly differed between the two groups ($P < 0.05$). No significant difference was detected in the scores of hostility, phobic anxiety, paranoid ideation and psychoticism between the two groups (Table 4).

Table 3 Correlation of the individual variables of NIH-CPSI and sexual dysfunctions

Comparison	Correlation coefficient	P
NIH-CPSI and ED (IIEF5)	−0.255	0.0017*
NIH-CPSI and PE	−0.0317	0.699
Pain index and ED	−0.094	0.251
Urination and ED	−0.13	0.114
EP and ED	−0.227	0.005*
Pain index and PE	−0.05	0.547
Urination and PE	−0.054	0.509
EP and PE	−0.07	0.393

* $P < 0.01$

We analyzed the correlations between the psychological problems and the scores of NIH-CPSI and sexual dysfunctions. Significant correlations exist comparing the total scores, depression and anxiety scores of SP-90-R with the scores of NIH-CPSI and ED (Table 5).

Discussion

In the current study, we have conducted the largest scale investigation of sexual dysfunctions in a specific type of prostatitis, and the most comprehensive analyses of the correlation of psychological problems with sexual dysfunctions and CP symptoms in CP patients. Our results indicate a high prevalence of sexual disorders among Type IIIA CP patients, including 19 % of erectile dysfunctions,

Table 4 Scores of SP-90-R in CP patients and controls

Variables	CP (N-600)	Control	*P* values
Total score	121.9 ± 37.7	92.3 ± 1.9	0.014*
Somatization	17.2 ± 6.1	12.3 ± 0.7	0.012*
Obsessive–compulsive	14.7 ± 5.3	10.1 ± 0.3	0.008**
Interpersonal sensitivity	11.9 ± 4.1	9.1 ± 0.3	0.035*
Depression	17.0 ± 5.4	12.0 ± 0	0.004**
Anxiety	13.2 ± 5.0	10.2 ± 0.4	0.032*
Hostility	8.1 ± 2.9	6.4 ± 0.7	0.067
Phobic anxiety	8.1 ± 2.4	6.4 ± 0.7	0.29
Paranoid ideation	7.2 ± 2.3	6.3 ± 0.4	0.198
Psychoticism	13.0 ± 4.7	10.4 ± 0.8	0.082
Additional items	10.2 ± 4.2	7.2 ± 0.4	0.024*

Values are expressed as mean ± SD. Multivariance ANOVA was tested for the total scores and individual comparisons

* $P < 0.05$; ** $P < 0.01$

Table 5 Correlations of SP-90-R scores with those of NIH-CPSI and sexual dysfunctions

Variables	SP-90-R scores		
	Total score	Depression	Anxiety
NIH-CPSI	0.250**	0.195*	0.235**
EP	0.09	0.11	0.131
ED	−0.255**	−0.277**	−0.172*
PE	−0.032	−0.09	0.052

Values in the table are correlation coefficients between different scores of NIH-CPSI and sexual dysfunctions (EP, ED and PE) with those of SP-90-R

* $P < 0.05$; ** $P < 0.01$

30 % or more of premature ejaculation and 30 % of ejaculatory pain. Among them, 35, 56 and 23 patients had simultaneous PE and EP (5.8 %), ED and PE (9.3 %), and ED and EP (3.8 %), respectively. Thus, the total sexual dysfunction prevalence was 60.3 % (if 2 min cutoff time for PE) or higher (if more than 2 min cutoff time for PE) among Type IIIA CP patients. Surprisingly, moderate to severe erectile dysfunctions occurred more in men of 20–40 years than those of 40–50 years. The severity of CP symptoms (NIH-CPSI scores) correlated significantly with that of erectile dysfunction (IIEF-5 scores), but not of premature ejaculation. In general, psychological problems were frequent among the CP patients. The primary symptoms include somatization, obsessive–compulsive, interpersonal sensitivity, depression and anxiety. As a result, the total psychological scores were significantly higher in the CP patients than in normal men.

The negative impact of CP on sexual functions was examined previously in Chinese men. Among 370 men suffered from chronic prostatitis, ED prevalence as assessed by IIEF-5 score was 35.1 % [9], and the rate of premature ejaculation was 36.9 %, for which the cutoff time was 1 min [11]. In our study, the ratios of ED (19 %) and PE (9.3 % with 1 min cut off time) in type IIIA CP are both dramatically lower than in the previous reports. The previous surveys in China did not exclude bacterial infection and type IIIb CP; these types of CP, particularly type II CP (BHP), may exert stronger influences on sexual functions. In fact, the prevalence of EP did appear to be higher in type IIIb CP patients [20], and rates of impaired erection were significantly higher in patients with bacterial chronic prostatitis comparing to patients with type III CP [28]. Thus, our data suggest that the prevalence of sexual dysfunctions among type IIIA CP patients appears to be less frequent than among other types of CP patients. However, other factors may confound this assumption. For example, sexual dysfunctions in CP may change dynamically with changing life styles, education of sexual knowledge and healthcare, and there may be geographical differences. To clarify this issue, future studies will be necessary to compare other types of CP simultaneously and in the same sampling areas.

Analyses of the individual variances revealed that NIH-CPSI scores correlated with the IIEF-5 scores, but not PE and EP. Thus, the extent of erectile dysfunction appears to be more closely associated with the severity of CP symptoms comparing to other sexual dysfunctions. As a matter of fact, few previous investigations have performed a direct correlation analysis as in our study, regardless of the frequent reports of high rates of sexual dysfunctions associated with CP. This feature may be specific to type IIIA CP patients, implying that ED and type IIIA CP share some similar mechanisms of pathogenesis, in which inflammation may play a critical role.

A surprising finding in our study is that rate of erectile dysfunctions was higher among CP patients of younger age, as opposed to the previous report that the prevalence of ED increases with older age among Chinese CP patients [9, 11, 12]. However, there were other studies that reported similar findings to ours [29]. One possible reason is that pain and sexual dysfunctions may cause greater psychosocial difficulties in young men who are more likely to be in newer relationships or are in the process of forming them. Higher expectations in young people can result in more sexual complaints, including infrequent ejaculation related to prostatic congestion [30]. Chronic prostatitis is one of the main causes of prostatic congestion [31], which happens when the prostate becomes swollen by excess fluid, but is rarely addressed in the research of prostatitis. Since prostatic congestion can be effectively alleviated by prostate message [32], its measurement and correlation with sexual complaints in future investigations should provide clinical basis for specific treatment of sexual dysfunctions in the young chronic prostatitis patients.

It is well known that chronic prostatitis causes various psychological and mood problems, such as depression, anxiety, hysteria, hypochondriasis and somatization disorders [26, 33–36]. Psychological stresses, vice versa, were often found to contribute or exacerbate the symptoms of CP [37]. A few attempts have been made to evaluate the relationship of psychological problems and sexual dysfunctions in CP patients [19, 36, 38, 39]. In particular, depression was found to have a negative effect on orgasm, sexual satisfaction and measures of sensuality [19, 39]; lower the frequency of sexual activity and more difficulty achieving orgasm, lower levels of arousal, and poorer erectile functioning [38]. It is believed that understanding the role of mood and psychological problems on sexual functioning in CP may yield important etiological and treatment information [29], while a comprehensive analysis of these aspects is lacking. In China, no study has directed to investigate the psychological problems of chronic prostatitis, not to mention their relationship with sexual dysfunctions in CP patients. We have conducted the most comprehensive evaluation of the association of psychological problems with sexual dysfunctions in CP patients. Our data show that a variety of psychological problems exist among Chinese men with CP. Consistent with previous studies, depression was significantly correlated with erectile dysfunctions. Beyond, we show that anxiety was another critical psychological problem affecting erectile dysfunction. However, no other sexual dysfunctions except ED were associated with psychological problems, and no psychological problems other than depression and anxiety were associated with sexual dysfunctions in CP patients. Our results suggest that particular attention should be paid to depression and anxiety in the treatment of CP symptoms and the associated erectile dysfunctions. However, as we specifically examined type IIIA CP, it remains a question whether our findings are applicable to other types of prostatitis.

While we have provided data on a specific type of chronic prostatitis, it is also a limitation as we cannot make a direct comparison between Type IIIa and other types of CP. Consequently, we are not able to generalize our findings to all types of chronic prostatitis. Future studies should be directed to comparative analyses of all types of CP regarding the association of sexual dysfunctions and psychological problems, so that a more complete picture can be drawn.

Conflict of interest The authors declare there is no conflict of interest.

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