ASSOCIATION OF ERECTILE DYSFUNCTION AND PREMATURE EJACULATION IN MEN WITH CHRONIC PROSTATITIS

Min Ho Lee[1], Deok Ha Seo[1], Chun Woo Lee[1], Jae Hwi Choi[2], Seong Uk Jeh[2], Sin Woo Lee[2], See Min Choi[2], Jeong Seok Hwa[2], Jae Seog Hyun[2], Ky Hyun Chung[2], and Sung Chul Kam[1]

[1]Department of Urology, Gyeongsang National University Changwon hospital, Changwon, Gyeongsang National University School of Medicine, Jinju, Korea

[2]Department of Urology, Gyeongsang National University Hospital, Gyeongsang National University School of Medicine, Institutes of Health Science, 79 Gangnam-ro, Jinju, Korea

Corresponding Author: Sung Chul Kam, MD, PhD: kamsungchul@hanmail.net

ABSTRACT

Background and objective
Although several studies have reported that sexual dysfunction is associated with chronic prostatitis (CP), specific differences in self-reported questionnaires and correlation with CP are not well-known. This study aimed to evaluate the prevalence and correlation of sexual dysfunction in men with CP.

Material and methods
This cross-sectional study included 892 men who visited our health care center, who were then divided into two groups. In Group 1, subjects are characterized with National Institutes of Health Chronic Prostatitis Symptom Index (NIH-CPSI) pain score ≥4, and Group 2 subjects are characterized with NIH-CPSI<4. Intravaginal Ejaculation Latency Time, Premature Ejaculatory Diagnostic Tool (PEDT), Male Sexual Health Questionnaire-ejaculation, International Index of Erectile Function (IIEF), and IIEF-5 were self-reported by participants. Total testosterone (TT) level was also checked. Data obtained were compared between the groups and the relationships identified.

Results
The mean age was 52.8±7.3 years, and CP was prevalent in 136 (15.2%) of the 892 participants. All questionnaire scores showed worse results in Group 1 compared to those in Group 2 (p<0.05). In total, the prevalence of erectile dysfunction (IIEF-5≤21) and premature ejaculation (PEDT≥9) were 508 (56.3%)

and 290 (32.5%), respectively. A higher prevalence of erectile dysfunction (71.3% vs. 53.6%, p<0.001) and premature ejaculation (44.8% vs. 30.3%, p=0.001) was identified in Group 1 than in Group 2. By correlation analysis, IIEF-5 (r=−0.208, p=0.015) and TT (r=−0.331, p=0.011) showed correlation with NIH-CPSI pain score in Group 1.

Conclusion

The prevalence and severity of erectile dysfunction and premature ejaculation were higher in Group 1. Moreover, the IIEF-5 showed correlation with NIH-CPSI pain score. These results indicate that screening for erectile dysfunction and premature ejaculation in men with CP is useful for early detection of comorbidities.

Key Words: *Prostatitis, Sexual Dysfunction, Premature Ejaculation, Erectile Dysfunction, Questionnaires*

INTRODUCTION

Chronic prostatitis/chronic pelvic pain syndrome (CP/CPPS; National Institute of Health (NIH) category III prostatitis) is a common clinical disorder affecting up to 15% of the male population.[1] It is characterized by pain or discomfort localized to the abdomen, pelvis, and genitals, as well as lower urinary tract symptoms in the absence of urinary tract infection. These symptoms worsen the quality of life and increase social healthcare costs.[2] The NIH-Chronic Prostatitis Symptom Index (NIH-CPSI) is a validated questionnaire that allows evaluation of pain, voiding, and quality of life. It is most commonly used for evaluating the symptoms of CP.[3] From the past, there is a growing appreciation of the relationship of sexual dysfunction with CP/CPPS. For example, the reported prevalence of erectile dysfunction was 31.5% in patients with CP/CPPS in Italy,[4] 48.3% in patients with CP/CPPS in Malaysia,[5] and 35.1% in patients with CP/CPPS in China.[6] Cho et al. reported that higher NIH-CPSI pain and quality of life score affects erectile dysfunction in Korean men with CP/CPPS in their 40s–50s.[7]

Globally, erectile dysfunction is the most common sexual dysfunction in men, and it has a significant effect on the quality of life. Risk factors for erectile dysfunction are comorbidities such as hypertension, diabetes mellitus, peripheral neuropathy, sleep disorders, and chronic renal failure[8–11]; age, hypogonadism, and lower urinary tract symptoms are also considered risk factors for erectile dysfunction.[12,13] In addition, several studies have reported that premature ejaculation is also associated with erectile dysfunction.[14,15]

While the prevalence of premature ejaculation is reported to vary from 3 to 30%,[16–18] it is regarded as the most common among ejaculation disorders.[19] According to the International Society for Sexual Medicine, premature ejaculation could be classified as lifelong premature ejaculation (ejaculation <1 min) or acquired premature ejaculation (ejaculation≤3 min). As an organic factor of premature ejaculation, lifelong premature ejaculation is mainly attributed to genetic factors, while acquired premature ejaculation may be caused by hormone imbalance, metabolic syndrome, prostatitis, and erectile dysfunction.[20–22]

As mentioned above, erectile dysfunction and premature ejaculation have relationships among men with CP/CPPS. Thus, the primary aim of this study was to investigate the association of sexual dysfunction with CP/CPPS using self-reported questionnaires. However, there were no previous studies that reported the correlation of sexual dysfunction-related questionnaire including Male Sexual Health Questionnaire-ejaculation (MSHQ-EjD) and serum total testosterone (TT) levels in men with CP. So, the secondary aim was to concordantly analyze the scores of MSHQ-EjD and TT level.

METHODS

Study population

In this cross-sectional study, data from 1121 men who visited our healthcare center for health check-up, between January 2014 and January 2019, were reviewed. The inclusion criteria were as follows: participants who were aged more than 40 years and who completely filled out the questionnaires. It is available to take urologic health check-up who are older than 40 years in our country. The exclusion criteria were as follows: (1) participants who did not completely fill out the questionnaires; (2) participants who had been diagnosed and were on medication for psychogenic disease and/or vascular-related disease, such as diabetes mellitus and coronary heart disease, were excluded; and (3) participants who had already been treated for urologic malignancy, CP/CPPS, premature ejaculation, and erectile dysfunction were also excluded. In total, 892 participants (aged 40–79 years) were enrolled.

Ethics statement

The study's retrospective protocol was approved by the appropriate institutional review board (IRB). All procedures complied with the ethical standards of the institutional and/or national research committees and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The requirement for informed consent was waived by the IRB based on the study's retrospective nature.

Questionnaire

Medical histories of the patients were collected using a standardized, structured questionnaire. All participants completed the NIH-CPSI, International Index of Erectile Function (IIEF), IIEF-5, MSHQ-EjD, and Premature Ejaculation Diagnostic Tool (PEDT) questionnaires, whose Korean versions had been validated, after sufficient explanation of each item. Intravaginal Ejaculation Latency Time (IELT) was also reported. Laboratory test including serum TT was also performed. Collected questionnaires were analyzed. Patients were grouped into two as follows: Those with NIH-CPSI pain scores ≥4 were defined as having prostatitis-like symptoms (Group 1), and those with NIH-CPSI pain scores <4 do not have prostatitis-like symptoms (Group 2). Men with IIEF5 scores ≤21 were classified as having erectile dysfunction. In this study, erectile dysfunction was classified as normal (IIEF-5>21), mild (IIEF-5>11, IIEF5≤21), moderate (IIEF-5>7, IIEF-5≤11), and severe (IIEF-5≤7). Men with PEDT scores ≥9 were classified as having premature ejaculation. PEDT scores 9–10 were classified as probable premature ejaculation and PEDT≥11 as definite premature ejaculation. Participants were asked to report their IELT as less than 1 min, 1–5 min, and 5 min or longer. IELT<5 min was defined as premature ejaculation and less than 1 min as severe premature ejaculation. Finally, the total MSHQ-EjD score was analyzed, and more higher scores indicated good ejaculation status.

Statistical analysis

Continuous variables were evaluated using the Student t-test, and categorical variables were evaluated using the chi-squared test for intergroup comparisons. The correlations between NIH-CPSI pain score and other questionnaire scores were assessed using Pearson's correlation in Groups 1 and 2. In addition, partial correlation analysis was performed with age adjustment. Statistical analyses were performed using SPSS version 25.0 (IBM Corp., Armonk, NY). All tests were two-sided, and significant differences were set at $p<0.05$.

RESULTS

The mean age of the 892 subjects was 52.8±7.3 years, and there were 324 subjects in their 40s, 420 in 50s, 126 in 60s, and 22 in 70s (Table 1).

TABLE 1 Baseline Characteristics of all Participants

Variable	Total (N=892)	Group 1 (N=136) NIH-CPSI pain ≥4	Group 2 (N=756) NIH-CPSI pain<4	p-value
Mean±SD				
Age, years	52.8±7.3	53.7±7.8	52.6±7.2	0.118
Age group (%)				0.067
40–49 years	324 (36.3)	39 (28.7)	285 (37.7)	
50–59 years	420 (47.1)	66 (48.5)	354 (46.8)	
60–69 years	126 (14.1)	25 (18.4)	101 (13.4)	
70–79 years	22 (2.5)	6 (4.4)	16 (2.1)	
Total testosterone, ng/mL	4.8±1.7	4.9±1.6	4.8±1.7	0.75
NIH-CPSI sub-scores				
Total	8.0±5.8	15.1±5.0	6.8±4.9	<0.001
Pain	1.8±2.4	6.2±2.2	0.5±0.9	<0.001
Voiding	2.6±2.3	3.6±2.6	2.5±2.3	<0.001
QOL	4.0±2.4	5.3±2.3	3.7±2.3	<0.001
IIEF sub-scores				
Erectile function	20.9±7.9	18.3±8.3	21.4±7.8	<0.001
Orgasmic function	7.4±3.0	6.8±3.1	7.6±2.9	0.006
Sexual desire	4.7±2.0	4.3±2.0	4.7±2.0	0.016
Intercourse satisfaction	8.2±3.6	7.7±3.8	8.4±3.5	0.042
Overall satisfaction	4.8±1.9	4.3±2.0	4.9±1.9	0.003
IIEF-5	18.5±5.6	16.4±6.0	18.9±5.4	<0.001
MSHQ-EjD	26.5±6.1	25.0±6.1	26.8±6.0	<0.001
PEDT	6.7±4.3	8.1±4.7	6.4±4.2	<0.001

IIEF, International Index of Erection Function; MSHQ-EjD, Male Sexual Health-Ejaculatory Dysfunction Questionnaire-Ejaculatory Dysfunction; NIH-CPSI, Chronic Prostatitis Symptom Index of the National Institutes of Health; PEDT, Premature Ejaculation Diagnostic Tool; QOL, quality of life; SD, standard deviation.

According to the NIH-CPSI pain score, summed score ≥4 was classified as presence of CP-like symptoms (Group 1, N=136) and <4 as absence of CP-like symptoms (Group 2, N=756). No differences in age (p=0.067) and TT levels (p=0.750) were found between the groups. All sub-scores of NIH-CPSI were statistically higher in Group 1 than in Group 2 (all, p<0.001). Conversely, all sub-scores of IIEF were significantly lower in Group 1 than in Group 2 (all, p<0.05). The mean IIEF5 score was 18.5±5.6, and 16.4±6.0 and 18.9±5.4 for Groups 1 and 2, respectively (p<0.001). MSHQ-EjD score was lower in Group 1 (p<0.001), and PEDT score was higher in Group 1 than in Group 2 (p<0.001).

Table 2 shows the prevalence and severity of erectile dysfunction and premature ejaculation in all subjects and differences between the groups. In Groups 1 and 2, subgroups of erectile dysfunction (IIEF-5≤21) as mild, moderate, and severe had 67 (49.2%) versus 330 (43.6%), 16 (11.8%) versus 32 (4.2%), and 14 (10.3%) versus 43 (5.7%)

TABLE 2 Prevalence and Severity of ED and PE According to the NIH-CPSI Pain Scores

Variable (Mean±SD)	Total (N=892)	Group 1 (N=136) NIH-CPSI pain score ≥4	Group 2 (N=756) NIH-CPSI pain score <4	p-value
ED (IIEF-5≤21, N [%])	508 (56.3)	97 (71.3)	405 (53.6)	<0.001
Mild (12–21)	397 (44.5)	67 (49.2)	330 (43.6)	
Moderate (8–11)	48 (5.4)	16 (11.8)	32 (4.2)	
Severe (≤7)	57 (6.4)	14 (10.3)	43 (5.7)	
PE (PEDT≥9, N [%])	290 (32.5)	61 (44.8)	229 (30.3)	0.001
Probable PE (9–10)	136 (15.2)	24 (17.6)	112 (14.8)	
PE (≥11)	154 (17.3)	37 (27.2)	117 (15.5)	
PE (IELT<5 min, N [%])	460 (51.6)	83 (61.0)	377 (49.8)	0.018
Severe PE (<1 min)	71 (8.0)	17 (12.5)	54 (7.1)	
PE (1–5 min)	389 (43.6)	66 (48.5)	323 (42.7)	

ED, erectile dysfunction; IELT, Intravaginal Ejaculation Latency Time; IIEF-5, International Index of Erection Function-5; PEDT, Premature Ejaculation Diagnostic Tool; NIH-CPSI, Chronic Prostatitis Symptom Index of the National Institutes of Health; PE, premature ejaculation; SD, standard deviation.

TABLE 3 Comparison of Coefficient Correlation between the NIH-CPSI Pain Scores and Total Testosterone and Sexual Function-Related Questionnaires According to the Groups

	Group 1 (N=136) NIH-CPSI pain score ≥4		Group 2 (N=756) NIH-CPSI pain score<4	
	r	p-value	r	p-value
NIH-CPSI pain score				
& Age	0.095	0.272	0.046	0.207
& Total testosterone	−0.331	0.011	0.026	0.625
& MSHQ-EjD	−0.082	0.341	−0.057	0.285
& IIEF-EF	−0.104	0.23	−0.088	0.275
& IIEF-5	−0.208	0.015	−0.153	0.091
& PEDT	0.015	0.864	0.008	0.589
& IELT	−0.124	0.151	−0.079	0.13

IELT, Intravaginal Ejaculation Latency Time; IIEF-EF, International Index of Erection Function-Erectile Function; MSHQ-EjD, Male Sexual Health Questionnaire-Ejaculatory Dysfunction; NIH-CPSI, National Institutes of Health Chronic Prostatitis Symptom Index; PEDT, Premature Ejaculation Diagnostic Tool.

subjects, respectively (p<0.001). The number of subjects in all subgroups of erectile dysfunction were higher in Group 1 than in Group 2 (p<0.001). In Groups 1 and 2, 61 (44.8%) versus 229 (30.3%) subjects had premature ejaculation (PEDT≥9) and 37 (27.2%) versus 117 (15.5%) subjects had definite premature ejaculation (PEDT≥11), respectively (p<0.001). In Groups 1 and 2, 17 (12.5%) versus 54 (7.1%) subjects had severe premature ejaculation (IELT<1 min), respectively (p=0.018).

Table 3 shows the correlation of age, TT, and sexual dysfunction-related questionnaire scores

between the NIH-CPSI pain scores in Groups 1 and 2. In Group 1, excluding TT level and IIEF-5 score, other scores showed no significant correlation with the NIH-CPSI pain score (p>0.05). TT level showed the strongest negative correlation (r=−0.331, p=0.011), and IIEF-5 showed the second weak correlation (r=−0.208, p=0.015) between the NIH-CPSI pain scores in CP subjects. By contrast, no significant correlation was found in Group 2 (all p>0.05).

Since TT and EF are closely related to age, we additionally performed correlation analysis with age adjustment, as shown in Table 4. In addition to TT and IIEF-5, MSHQ-EjD also showed a significant negative correlation in Group 1 (r=−0.329, p=0.013); furthermore, MSHQ-EjD demonstrated a weak negative correlation in Group 2 (r=−0.126, p=0.017). No other significant differences were found among the results shown in Table 3.

DISCUSSION

The main findings of the present study were that more than 70% of the participants with CP had erectile dysfunction (71.3%), and more subjects in the CP group had moderate or severe erectile dysfunction.

CP is a very common disease of urology. In a previous study, almost 2 million men visited clinics annually for treatment of prostatitis in the USA.[23] On the contrary, Zhang et al.[24] reported higher prevalence of erectile dysfunction in 12,743 Chinese men (aged 15–60 years) in Beijing, in which the prevalence of prostatitis-like symptoms was 8.4% and prostatitis-like symptoms were defined on the basis of the NIH-CPSI questions.[25] Similar to the present study, previous studies have reported a prevalence of erectile dysfunction in patients with CP/CPPS of 31.5–48.3%.[4,5,26] Li et al. conducted a meta-analysis and reported prevalence of erectile dysfunction (IIEF≤21) and premature ejaculation (PEDT≥9) as 71.3 and 44.8 %, respectively.[27] In the present study, 56.6 and 32.5% of the subjects had erectile dysfunction and premature ejaculation among all subjects, which were 71.3 and 44.8% in the CP group, respectively.

Globally, the prevalence of sexual dysfunction among men with CP/CPPS had an increasing trend in recent years. A cross-sectional study from

TABLE 4 Comparison of Age-Adjusted Partial Correlation between the NIH-CPSI Pain Scores and Total Testosterone and Sexual Function-Related Questionnaires According to the Groups

	Group 1 (N=136) NIH-CPSI pain score ≥4		Group 2 (N=756) NIH-CPSI pain score<4	
	r	p-value	r	p-value
NIH-CPSI pain score				
& Total testosterone	−0.359	0.006	0.028	0.598
& MSHQ-EjD	−0.329	0.013	−0.126	0.017
& IIEF-EF	−0.242	0.07	−0.065	0.218
& IIEF-5	−0.257	0.043	−0.266	0.104
& PEDT	0.053	0.694	0.026	0.139
& IELT	−0.026	0.85	−0.067	0.204

IELT, Intravaginal Ejaculation Latency Time; IIEF-EF, International Index of Erection Function-Erectile Function; MSHQ-EjD, Male Sexual Health Questionnaire-Ejaculatory Dysfunction; NIH-CPSI, National Institutes of Health Chronic Prostatitis Symptom Index; PEDT, Premature Ejaculation Diagnostic Tool.

Singapore indicated that men with CP/CPPS had worse erectile function as measured with the IIEF assessment tool compared to men without prostatitis.[28] A case–control study conducted in Taiwan revealed that men with erectile dysfunction were more likely to have had a diagnosis of CP/CPPS (OR 3.62; 95 % CI 3.07–4.26) than controls after adjusting for covariates.[29]

Although the mechanisms underlying the association of CP with erectile dysfunction remain unclear, our findings have important implications for understanding CP and for the design of treatment studies. The high prevalence of erectile dysfunction and premature ejaculation in men with prostatitis-like symptoms suggests that screening for erectile dysfunction and premature ejaculation among those individuals may be warranted. Furthermore, patients with CP had higher PEDT scores and lower IIEF sub-scores and IIEF-5 scores than those without CP. Thus, interventions to evaluate and improve erectile dysfunction might help ameliorate prostatitis-like symptoms. In addition, measurement of erectile dysfunction could provide an outcome measure in future treatment studies for CP.

To the best of our knowledge, this is the first study to evaluate the correlation of sexual dysfunction-related questionnaire, including MSHQ-EjD and TT levels, in men with CP. In the present study, MSHQ-EjD scores between the groups showed significant differences (p<0.001) similar to the IIEF-5 and PEDT scores. However, MSHQ-EjD scores did not show significant correlation between the NIH-CPSI pain scores (r=−0.082, p=0.341). We also performed laboratory studies, including TT levels, in all subjects. The results did not show between-group differences. In fact, we did not perform the tests more than twice early morning, and the results were still not reliable. However, TT showed the strongest negative correlation between the NIH-CPSI pain scores in the CP group. We presumed that some confounding biases exist; thus, we performed another analysis with age adjustment. We assumed that we could find an additional negative correlation between MSHQ-EjD and CP pain score in both groups. However, assessing the relationship between CP and ED and PE was not enough; hence, prospective investigation in the near future is warranted.

The underlying mechanisms of CP/CPPS-associated sexual dysfunction remain unclear. Vasogenic, endocrine, and neurogenic factors, as well as psychological factors, may play important roles in the pathogenesis of sexual dysfunction in CP/CPPS. Patients with CP/CPPS are more likely to have nitric-oxide-mediated vascular endothelial dysfunction compared to asymptomatic controls, which contribute to sexual dysfunction in these populations.[30] In addition, a link between sexual function and CP might be a psychological factor.[27] Sexual dysfunction due to psychological causes in patients with CP/CPPS was high, and men with CP/CPPS experienced more depression and impaired sexual function.[15] Multivariate logistic regression demonstrated that symptom severity (evaluated by NIH-CPSI) was also an independent risk factor for erectile dysfunction in patients with CP/CPPS.[24]

This study had some limitations. First, the cross-sectional nature of the dataset in single center made causal inferences an issue. However, we are going to study about this topic with prospective and multicenter protocol as soon as possible. Second, the age of participants could exert an important effect on the prevalence of sexual dysfunction, particularly on erectile dysfunction. However, subgroup analysis based on age was not performed due to the insufficient number of older and younger subjects, and we only performed analysis with age adjustment. Third, because all subjects visited the center for general health check-up, they did not fill out the medical and demographic status. This did not enable us to perform the multi-, univariable analysis. But, it should be done in the near future. Fourth, survey

results were based on self-reported data by the participants. This introduces a potential for response bias, as respondents may inaccurately report their symptoms. However, the questionnaires selected for this study have all been previously validated in clinical and nonclinical samples and are widely used in various studies. Fifth, self-reported questionnaires tend to be more inaccurate than imaging study, including transrectal ultrasonography, rigid scan, etc. Especially in IELT, stopwatch-recorded IELT would be more accurate to evaluate premature ejaculation. Finally, we did not investigate the marital status, and cut-off of premature ejaculation by IELT was <5 min, not 3 min. However, this was based on a previous study: Korean urologists asked about IELTS criteria for premature ejaculation, and 80% of the participants defined premature ejaculation as <5 min. In the near future, we would be studying the differences in the prevalence of premature ejaculation between cut-off of IELT 3 min versus 5 min.

CONCLUSIONS

IIEF, IIEF-5, MSHQ-EjD and PEDT scores showed significant differences between the groups according to the NIH-CPSI pain score. Also, the prevalence and severity of erectile dysfunction and premature ejaculation were higher in CP group (Group 1). Moreover, the IIEF-5 showed correlation with NIH-CPSI pain score. This result indicates that screening for erectile dysfunction and premature ejaculation in men with CP is useful for early detection of comorbidities.

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CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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