

## Original Research

# The severity of lower urinary tract symptoms is increased in patients with premature ejaculation among aging Korean men

Jae Hwi Choi<sup>1</sup>, Min Ho Lee<sup>1</sup>, Sin Woo Lee<sup>1</sup>, Chun Woo Lee<sup>1</sup>, Seong Uk Jeh<sup>1</sup>, See Min Choi<sup>1</sup>, Sung Chul Kam<sup>1</sup>, Jeong Seok Hwa<sup>1</sup>, Jae Seog Hyun<sup>1,\*</sup>

<sup>1</sup>Department of Urology, Gyeongsang National University and Hospital, 52727 Jinju, Korea

\*Correspondence: [hyunjs@gnu.ac.kr](mailto:hyunjs@gnu.ac.kr) (Jae Seog Hyun)

## Abstract

**Introduction and objective:** The purpose of this study was to compare the severity of lower urinary tract symptoms (LUTS) between patients with and without premature ejaculation (PE). **Materials and method:** The relationship between the severity of LUTS and PE was investigated among 825 male subjects, who underwent medical check-up between July 2013 and July 2018 in our hospital. PE was defined by self-reported intravaginal ejaculation latency time (IELT). The severity of LUTS was determined by international prostate symptom score (IPSS), overactive bladder symptom score (OABSS), transrectal ultrasonography (TRUS), and uroflow rate. A total of 825 subjects were classified into three groups: PE-group (N = 60), Self-reported PE-group (N = 353), and Non-PE group (N = 412). **Results:** In comparison analysis involving the two groups, the PE-group and the Self-reported PE-group were analyzed to be statistically significantly higher in IPSS items and OABSS items, compared to the Non-PE group ( $P < 0.05$ ). This showed the same results in the univariate analysis ( $P < 0.05$ ). Multivariate analysis conducted with the PE-group versus the Non-PE group, and the Self-reported PE-group versus the Non-PE group, revealed significant differences in the values of total IPSS ( $P < 0.05$ ). **Conclusion:** Comparison between the PE-group, which included the Self-reported PE-group, and the Non-PE group suggest that the severity of LUTS was comparatively higher in the PE-group. Thus, it is thought that being associated with or without PE may be a significant factor to consider, which affects LUTS severity.

## Keywords

Lower urinary tract symptoms; Severity; Premature ejaculation

## 1. Introduction

According to several literatures, the frequency of the occurrence of ejaculatory dysfunction (ED) is distributed in the range of approximately 3-75% according to age and race [1, 2], wherein the severity of ED has been reported as increasing in accordance with increasing age [1]. The normal mechanism of ejaculation includes the entire process of sexual response in the complex systemic pathway, resulting in the final emission and expulsion via somatic and autonomic nerve fibers innervating the penis, for which the parasympathetic nerve fibers that originated from the pudendal nerve and

S2-4, and the sympathetic nerve fibers that originated from T11-L2 have been reported to be involve [2]. Autonomic nerve fibers related to the mechanism also participate in the process of normal micturition [3], and the elucidation on the possible concurrence of lower urinary tract symptoms (LUTS) and ED eventually resulting from an endothelial-related pathway dysfunction has been reported [1]. Thus, patients with LUTS accompanying ED have been reported in several studies [4-7], with several reports touching upon the positive therapeutic effect of  $\alpha$ -blocker upon premature ejaculation (PE) patients [8, 9]. These reports suggest that the concomitant treatment of ED may be essential for the

treatment of LUTS.

In general, ED is being reported in various forms such as PE, delayed ejaculation and painful ejaculation, retrograde ejaculation, etc. Generally, PE is most frequently reported by occupying 20-40% [2, 9, 10]. However, studies related with the correlation between PE and the severity of LUTS are rare in spite of the highest frequency of the occurrence of PE accompanying ED.

**TABLE 1. Base characteristics.**

Parameters	Patient total (SD) (N = 825)
Age (yrs)	54.58 (8.31)
Hypertension	825 (100.00%)
Yes	554 (67.15%)
No	271 (32.85%)
Diabetes	825 (100.00%)
Yes	55 (6.67%)
No	770 (92.33%)
BMI (kg/m <sup>2</sup> )	24.58 (2.91)
ANC (X10 <sup>3</sup> /mm <sup>3</sup> )	3.20 (1.33)
Total cholesterol (mg/dL)	191.52 (41.23)
TPSA (ng/mL)	1.18 (1.08)
TRUS (g)	26.51 (11.23)
Testosterone (ng/mL)	4.86 (1.64)
Max flow rate (mL/s)	20.01 (16.05)
Urine volume (cc)	212.24 (129.57)
IPSS Total	10.17 (6.91)
IPSS-V	6.27 (4.83)
IPSS-S	3.90 (2.88)
QoL	2.63 (1.31)
IIEF-15 total	52.96 (15.70)
IIEF-EF	22.91 (7.49)
IIEF-IS	8.57 (3.41)
IIEF-OF	7.71 (2.80)
IIEF-SD	6.83 (1.93)
IIEF-OS	6.93 (1.87)
PEDT	6.60 (4.30)
OABSS	2.60 (2.36)

PE, premature ejaculation; BMI, body mass index; ANC, absolute neutrophil count; TPSA, total prostate-specific antigen; TRUS, transrectal ultrasonography; IPSS, International Prostate Symptom Score; V, voiding; S, storage; IIEF, International Index of Erectile Function score; EF, erectile function; IS, intercourse satisfaction; OF, orgasmic function; SD, sexual desire; OS, overall satisfaction; PEDT, premature ejaculation diagnostic tool; OABSS, overactive bladder symptom score.

In this study, the male patients who underwent health examinations in our hospital were selected as subjects to analyze the correlation between the severity of LUTS and PE in order to provide clinical information for the treatment of PE patients.

## 2. Method

A total of 825 patients, who took comprehensive medical examinations in the hospital from July 2013 to July 2018, participated in this study. The maximum urinary flow rate, uri-

**TABLE 2. Comparison of factors between the PE group and the non-PE group.**

Parameters	PE group (SD) (N = 60)	Non-PE group (SD) (N = 412)	P-value
Age (yrs)	56.38 (8.80)	54.34 (8.24)	0.076
Hypertension	60 (100.00%)	412 (100.00)	0.669
Yes	41 (68.33%)	270 (65.53%)	
No	19 (31.67%)	142 (34.47%)	
Diabetes	60 (100.00%)	412 (100.00)	0.332
Yes	2 (3.33%)	27 (6.55%)	
No	58 (96.67%)	385 (93.45%)	
BMI (kg/m <sup>2</sup> )	24.10 (3.18)	24.54 (2.82)	0.263
ANC (X10 <sup>3</sup> /mm <sup>3</sup> )	3.25 (1.46)	3.21 (1.49)	0.833
Total cholesterol (mg/dL)	185.43 (35.62)	193.53 (46.94)	0.200
TPSA (ng/mL)	1.08 (0.85)	1.18 (1.00)	0.470
TRUS (g)	28.51 (30.320)	26.26 (8.07)	0.571
Testosterone (ng/mL)	5.39 (1.60)	4.80 (1.60)	0.008
Max flow rate (mL/s)	17.53 (12.40)	19.97 (15.52)	0.245
Urine volume (cc)	200.11 (129.94)	210.73 (122.97)	0.535
IPSS total	15.83 (7.94)	8.69 (6.33)	0.000
IPSS-V	10.07 (5.64)	5.26 (4.45)	0.000
IPSS-S	5.77 (3.49)	3.43 (2.65)	0.000
QoL	3.57 (1.27)	2.35 (1.32)	0.000
IIEF-15 total	34.03 (18.01)	57.18 (14.00)	0.000
IIEF-EF	14.73 (9.33)	24.68 (6.73)	0.000
IIEF-IS	4.60 (3.62)	9.45 (3.15)	0.000
IIEF-OF	5.02 (3.48)	8.22 (2.52)	0.000
IIEF-SD	4.95 (2.01)	7.32 (1.80)	0.000
IIEF-OS	4.73 (2.07)	7.50 (1.61)	0.000
PEDT	12.48 (4.06)	4.07 (2.99)	0.000
OABSS	3.72 (3.21)	2.26 (2.07)	0.001

PE, premature ejaculation; BMI, body mass index; ANC, absolute neutrophil count; TPSA, total prostate-specific antigen; TRUS, transrectal ultrasonography; IPSS, International Prostate Symptom Score; V, voiding; S, storage; IIEF, International Index of Erectile Function score; EF, erectile function; IS, intercourse satisfaction; OF, orgasmic function; SD, sexual desire; OS, overall satisfaction; PEDT, premature ejaculation diagnostic tool; OABSS, overactive bladder symptom score.

nary volume, international prostatic symptom score (IPSS), overactive bladder symptom score (OABSS), transrectal ultrasonography (TRUS), prostatic-specific antigen (PSA), age, hypertension (HTN), diabetes mellitus (DM), body mass index (BMI), absolute neutrophil count (ANC), total cholesterol, testosterone, and the international index of erectile function-15 (IIEF-15) of subjects were collected retrospectively through a review of electronic medical records.

For the IPSS, the questions were divided into three groups of voiding (IPSS-V), storage (IPSS-S), and quality of life (QOL); with regard to the international index of erectile function-15 (IIEF-15), the questions were classified into erectile function (EF), intercourse satisfaction (IS), orgasmic function (OF), sexual desire (SD), and overall satisfaction (OS) for the analysis.

The subjects selected for this study were classified into three groups based on self-reported intravaginal ejaculation latency time (IELT) of each patient by considering the definition of the International Society for Sexual Medicine

(ISSM) and “Median IELT”, identified through several studies conducted on IELT with the general population [11–13], wherein the cases of IELT below 1 min were defined as the “PE-group (N = 60)” while those with IELT below 5 min were defined as the “Self-reported PE-group (N = 353)”. The cases of IELT beyond 5 min were classified as the “Non-PE group (N = 412)”.

Two groups were paired for each patient group, and correlation analysis was conducted through Pearson’s chi-square test for non-continuous variables and correlation analysis through *t*-test for continuous variables. Besides, we performed univariate and multivariate analyses for three types of paired groups; the statistical analyses of collected data were conducted by using the statistical package of SPSS (version 18.0), for which the cut-off value was set as  $P < 0.05$  to determine the statistical significance of each test.

This study was approved by the Gyeongsang National University Hospital Institutional Review Board (approval number: 2020-04-029-002).

**TABLE 3. Comparison of factors between the self-reported PE group and the non-PE group.**

Parameters	Self-reported PE group (SD) (N = 353)	Non-PE group (SD) (N = 412)	<i>P</i> -value
Age (yrs)	54.55 (8.30)	54.34 (8.24)	0.730
Hypertension	353 (100.00%)	412 (100.00)	
Yes	243 (68.84%)	270 (65.53%)	0.332
No	110 (31.16%)	142 (34.47%)	
Diabetes	353 (100.00%)	412 (100.00)	
Yes	26 (7.37%)	27 (6.55%)	0.659
No	327 (92.63%)	385 (93.45%)	
BMI (kg/m <sup>2</sup> )	24.70 (2.97)	24.54 (2.82)	0.436
ANC (X10 <sup>3</sup> /mm <sup>3</sup> )	3.17 (1.08)	3.21 (1.49)	0.705
Total cholesterol (mg/dL)	190.20 (34.39)	193.53 (46.94)	0.270
TPSA (ng/mL)	1.20 (1.20)	1.18 (1.00)	0.765
TRUS (g)	26.47 (8.01)	26.26 (8.07)	0.728
Testosterone (ng/mL)	4.83 (1.67)	4.80 (1.60)	0.817
Max flow rate (mL/s)	20.47 (17.17)	19.97 (15.52)	0.668
Urine volume (cc)	216.07 (137.00)	210.73 (122.97)	0.574
IPSS total	10.93 (6.76)	8.69 (6.33)	0.000
IPSS-V	6.81 (4.72)	5.26 (4.45)	0.000
IPSS-S	4.12 (2.88)	3.43 (2.65)	0.001
QoL	2.78 (1.21)	2.35 (1.32)	0.000
IIEF-15 total	51.24 (14.46)	57.18 (14.00)	0.000
IIEF-EF	22.24 (6.95)	24.68 (6.73)	0.000
IIEF-IS	8.23 (3.12)	9.45 (3.15)	0.000
IIEF-OF	7.57 (2.71)	8.22 (2.52)	0.001
IIEF-SD	6.57 (1.83)	7.32 (1.80)	0.000
IIEF-OS	6.64 (1.79)	7.50 (1.61)	0.000
PEDT	8.56 (3.58)	4.07 (2.99)	0.000
OABSS	2.81 (2.44)	2.26 (2.07)	0.001

PE, premature ejaculation; BMI, body mass index; ANC, absolute neutrophil count; TPSA, total prostate-specific antigen; TRUS, transrectal ultrasonography; IPSS, International Prostate Symptom Score; V, voiding; S, storage; IIEF, International Index of Erectile Function score; EF, erectile function; IS, intercourse satisfaction; OF, orgasmic function; SD, sexual desire; OS, overall satisfaction; PEDT, premature ejaculation diagnostic tool; OABSS, overactive bladder symptom score.

**TABLE 4. Comparison of factors between the PE group and the self-reported PE group.**

Parameters	PE group (SD) (N = 60)	Self-reported PE group (SD) (N = 353)	<i>P</i> -value
Age (yrs)	56.38 (8.80)	54.55 (8.30)	0.117
Hypertension	60 (100.00%)	353 (100.00%)	0.938
Yes	41 (68.33%)	243 (68.84%)	
No	19 (31.67%)	110 (31.16%)	
Diabetes	60 (100.00%)	353 (100.00%)	0.251
Yes	2 (3.33%)	26 (7.37%)	
No	58 (96.67%)	327 (92.63%)	
BMI (kg/m <sup>2</sup> )	24.10 (3.18)	24.70 (2.97)	0.147
ANC (X10 <sup>3</sup> /mm <sup>3</sup> )	3.25 (1.46)	3.17 (1.08)	0.691
Total cholesterol (mg/dL)	185.43 (35.62)	190.20 (34.39)	0.324
TPSA (ng/mL)	1.08 (0.85)	1.20 (1.20)	0.449
TRUS (g)	28.51 (30.320)	26.47 (8.01)	0.606
Testosterone (ng/mL)	5.39 (1.60)	4.83 (1.67)	0.016
Max flow rate (mL/s)	17.53 (12.40)	20.47 (17.17)	0.203
Urine volume (cc)	200.11 (129.94)	216.07 (137.00)	0.401
IPSS total	15.83 (7.94)	10.93 (6.76)	0.000
IPSS-V	10.07 (5.64)	6.81 (4.72)	0.000
IPSS-S	5.77 (3.49)	4.12 (2.88)	0.001
QoL	3.57 (1.27)	2.78 (1.21)	0.000
IIEF-15 total	34.03 (18.01)	51.24 (14.46)	0.000
IIEF-EF	14.73 (9.33)	22.24 (6.95)	0.000
IIEF-IS	4.60 (3.62)	8.23 (3.12)	0.000
IIEF-OF	5.02 (3.48)	7.57 (2.71)	0.000
IIEF-SD	4.95 (2.01)	6.57 (1.83)	0.000
IIEF-OS	4.73 (2.07)	6.64 (1.79)	0.000
PEDT	12.48 (4.06)	8.56 (3.58)	0.000
OABSS	3.72 (3.21)	2.81 (2.44)	0.041

PE, premature ejaculation; BMI, body mass index; ANC, absolute neutrophil count; TPSA, total prostate-specific antigen; TRUS, transrectal ultrasonography; IPSS, International Prostate Symptom Score; V, voiding; S, storage; IIEF, International Index of Erectile Function score; EF, erectile function; IS, intercourse satisfaction; OF, orgasmic function; SD, sexual desire; OS, overall satisfaction; PEDT, premature ejaculation diagnostic tool; OABSS, overactive bladder symptom score.

### 3. Results

The baseline characteristics of subjects selected for this study are as summarized in Table 1.

With regard to the comparison between the “PE-group” and the “Non-PE group”, statistically significant differences were found between the two groups in factors such as testosterone, IPSS, IIEF-15, PEDT, and OABSS ( $P < 0.05$ ) (Table 2). The level of testosterone of  $5.39 (\pm 1.60)$  ng/mL of the “PE-group” appeared higher than  $4.80 (\pm 1.60)$  ng/mL of the “Non-PE group”, and the difference between the two groups was statistically significant ( $P = 0.01$ ). In total scores of IPSS, QOL, IPSS-V, and IPSS-S, the subjects in the “PE-group” exhibited respective scores of  $27.40 (\pm 8.86)$ ,  $4.57 (\pm 1.27)$ ,  $14.07 (\pm 5.64)$ , and  $8.77 (\pm 3.49)$ , which appeared significantly higher than  $19.04 (\pm 7.35)$ ,  $3.35 (\pm 1.32)$ ,  $9.26 (\pm 4.45)$ , and  $6.43 (\pm 2.65)$  of the corresponding respective sub-questions of subjects in the “Non-PE group” ( $P = 0.00$ ).

TABLE 5. Univariate analysis of the potential risk factor for premature ejaculation.

	PE versus non-PE		PE versus self-reported PE		Self-reported PE versus non-PE	
	OR (CI 95%)	P-value	OR	P-value	OR	P-value
Age (yrs)	1.031 (0.997-1.066)	0.076	1.027 (0.993-1.062)	0.118	1.003 (0.986-1.020)	0.730
Hypertension	1.135 (0.635-2.028)	0.669	0.977 (0.542-1.760)	0.938	1.162 (0.858-1.574)	0.332
Diabetes	0.492 (0.114-2.123)	0.341	0.434 (0.100-1.877)	0.264	1.134 (0.649-1.982)	0.659
BMI (kg/m <sup>2</sup> )	0.947 (0.861-1.041)	0.263	0.933 (0.850-1.025)	0.148	1.020 (0.971-1.071)	0.435
ANC (X10 <sup>3</sup> /mm <sup>3</sup> )	1.019 (0.855-1.215)	0.833	1.060 (0.841-1.337)	0.621	0.980 (0.879-1.092)	0.712
Total cholesterol (mg/dL)	0.995 (0.988-1.002)	0.181	0.996 (0.988-1.004)	0.324	0.998 (0.994-1.002)	0.273
TPSA (ng/mL)	0.981 (0.651-1.219)	0.470	0.892 (0.664-1.199)	0.450	1.020 (0.896-1.161)	0.765
TRUS (g)	1.009 (0.993-1.024)	0.262	1.008 (0.992-1.024)	0.324	1.003 (0.986-1.021)	0.728
Testosterone (ng/mL)	1.237 (1.055-1.451)	0.009	1.207 (1.034-1.409)	0.017	1.010 (0.926-1.102)	0.817
Max flow rate (mL/s)	0.981 (0.953-1.010)	0.190	0.978 (0.949-1.009)	0.159	1.002 (0.993-1.011)	0.669
Urine volume (cc)	0.999 (0.997-1.002)	0.534	0.999 (0.997-1.001)	0.401	1.000 (0.999-1.001)	0.570
IPSS total	1.141 (1.097-1.185)	0.000	1.094 (1.054-1.136)	0.000	1.053 (1.0.0-1.077)	0.000
IPSS-V	1.194 (1.132-1.259)	0.000	1.130 (1.072-1.192)	0.000	1.077 (1.043-1.111)	0.000
IPSS-S	1.278 (1.171-1.395)	0.000	1.182 (1.084-1.288)	0.000	1.094 (1.038-1.152)	0.001
QoL	2.144 (1.669-2.752)	0.000	1.799 (1.381-2.242)	0.000	1.307 (1.165-1.465)	0.000
IIEF-15 total	0.932 (0.917-0.947)	0.000	0.942 (0.927-0.959)	0.000	0.971 (0.961-0.981)	0.000
IIEF-EF	0.881 (0.853-0.909)	0.000	0.896 (0.866-0.927)	0.000	0.949 (0.929-0.970)	0.000
IIEF-IS	0.724 (0.671-0.781)	0.000	0.747 (0.688-0.812)	0.000	0.883 (0.842-0.926)	0.000
IIEF-OF	0.739 (0.681-0.803)	0.000	0.778 (0.714-0.848)	0.000	0.909 (0.860-0.961)	0.001
IIEF-SD	0.544 (0.465-0.636)	0.000	0.641 (0.549-0.749)	0.000	0.794 (0.732-0.861)	0.000
IIEF-OS	0.499 (0.426-0.584)	0.000	0.614 (0.530-0.712)	0.000	0.741 (0.677-0.810)	0.000
PEDT	1.825 (1.592-2.093)	0.000	1.308 (1.207-1.416)	0.000	1.518 (1.427-1.615)	0.000
OABSS	1.251 (1.130-1.384)	0.000	1.129 (1.026-1.244)	0.013	1.115 (1.045-1.189)	0.001

PE, premature ejaculation; BMI, body mass index; ANC, absolute neutrophil count; TPSA, total prostate-specific antigen; TRUS, transrectal ultrasonography; IPSS, International Prostate Symptom Score; V, voiding; S, storage; IIEF, International Index of Erectile Function score; EF, erectile function; IS, intercourse satisfaction; OF, orgasmic function; SD, sexual desire; OS, overall satisfaction; PEDT, premature ejaculation diagnostic tool; OABSS, overactive bladder symptom score.

With regard to the OABSS, the subjects in “PE-group” also appeared with 7.72 ( $\pm$  3.21), which was significantly higher than 6.26 ( $\pm$  2.07) of the “Non-PE group” ( $P = 0.00$ ). With respect to the IIEF-15, the subjects in “PE-group” showed low level of scores in the total score and the sub-question score, comparing to those of subjects of the “Non-PE group” ( $P = 0.00$ ). The score of PEDT of subjects of the “PE-group” showed 17.48 ( $\pm$  4.06), which is significantly higher than 9.07 ( $\pm$  2.99) of subjects of the “Non-PE group” ( $P = 0.00$ ).

With regard to the comparison between the “Self-reported PE-group” and the “Non-PE group”, statistically significant differences were found in factors such as IPSS, IIEF-15, PEDT, and OABSS between the two groups ( $P < 0.05$ ) (Table 3). The “Self-reported PE-Group” exhibited scores of 21.71 ( $\pm$  7.66), 3.78 ( $\pm$  1.21), 10.81 ( $\pm$  4.72), and 7.12 ( $\pm$  2.88) for sub-questions comprising the total score of IPSS, QOL, IPSS-V, and IPSS-S, respectively, which are significantly higher than the corresponding scores of 19.04 ( $\pm$  7.35), 3.35 ( $\pm$  1.32), 9.26 ( $\pm$  4.45), and 6.43 ( $\pm$  2.65) of the subjects of the “Non-PE group” ( $P = 0.00$ ). The OABSS score of 6.81 ( $\pm$  2.44) of the subjects in the “Self-reported PE-group” was also significantly higher than the score of 6.26 ( $\pm$  2.07) of subjects in the “Self-reported Non-PE group” ( $P = 0.00$ ). And the score of IIEF-15 in the total score and sub-question scores of subjects in the “Self-reported PE group” appeared significantly lower than those of the subjects in the “Self-reported Non-PE group” ( $P = 0.00$ ). With regard

to the PEDT score of 13.56 ( $\pm$  3.58) of the subjects in the “Self-reported PE-group”, it appeared significantly higher than 9.07 ( $\pm$  2.99) of subjects in the “Self-reported Non-PE group” ( $P = 0.00$ ).

With regard to the comparison between the “PE-group” and the “Self-reported PE-group”, the statistically significant differences were found in factors such as testosterone, IPSS, IIEF-15, PEDT, and OABSS between the two groups ( $P < 0.05$ ) (Table 4). The level of testosterone of 5.39 ( $\pm$  1.60) ng/mL of the subjects in the “PE-group” appeared significantly higher than 4.83 ( $\pm$  1.67) ng/mL of the subjects in the “Self-reported PE-group” ( $P = 0.01$ ). The subjects of the “PE-group” exhibited respective total scores of 27.40 ( $\pm$  8.86), 4.57 ( $\pm$  1.27), 14.07 ( $\pm$  5.64), and 8.77 ( $\pm$  3.49) in the following sub-questions on IPSS, QOL, IPSS-V, and IPSS-S, which appeared significantly higher than the corresponding scores of 21.71 ( $\pm$  7.66), 3.78 ( $\pm$  1.21), 10.81 ( $\pm$  4.72), and 7.12 ( $\pm$  2.88) of the subjects in the “Self-reported PE-group” ( $P = 0.00$ ). With regard to the OABSS, the subjects in the “PE-group” also showed a significantly higher score of 7.72 ( $\pm$  3.21), compared to the score of 6.81 ( $\pm$  2.44) of the subjects in the “Self-reported PE-group” ( $P = 0.01$ ). In the total score and the sub-question scores of IIEF-15, the subjects in the “PE-group” appeared with lower level of each score thereof than those of subjects in the “Self-reported PE-group”, and the differences between the two groups were statistically significant ( $P = 0.00$ ). The PEDT score of 17.48

**TABLE 6. Multivariate analysis of the potential risk factor for premature ejaculation.**

	PE versus non-PE		PE versus self-reported PE		Self-reported PE versus non-PE	
	OR (CI 95%)	P-value	OR	P-value	OR	P-value
Age (yrs)						
Hypertension						
Diabetes						
BMI (kg/m <sup>2</sup> )						
ANC (X10 <sup>3</sup> /mm <sup>3</sup> )						
Total cholesterol (mg/dL)						
TPSA (ng/mL)						
TRUS (g)						
Testosterone (ng/mL)	1.207 (0.991-1.469)	0.062	1.271 (1.065-1.516)	0.008		
Max flow rate (mL/s)						
Urine volume (cc)						
IPSS total	1.088 (1.033-1.146)	0.001	1.047 (0.996-1.102)	0.074	1.036 (1.007-1.065)	0.013
IPSS-V						
IPSS-S						
QoL						
IIEF-15 total	0.941 (0.925-0.958)	0.000	0.945 (0.928-0.963)	0.000	0.976 (0.965-0.986)	0.000
IIEF-EF						
IIEF-IS						
IIEF-OF						
IIEF-SD						
IIEF-OS						
PEDT						
OABSS	1.037 (0.894-1.204)	0.629	1.028 (0.898-1.176)	0.690	1.019 (0.941-1.104)	0.644

PE, premature ejaculation; BMI, body mass index; ANC, absolute neutrophil count; TPSA, total prostate-specific antigen; TRUS, transrectal ultrasonography; IPSS, International Prostate Symptom Score; V, voiding; S, storage; IIEF, International Index of Erectile Function score; EF, erectile function; IS, intercourse satisfaction; OF, orgasmic function; SD, sexual desire; OS, overall satisfaction; PEDT, premature ejaculation diagnostic tool; OABSS, overactive bladder symptom score.

(± 4.06) of subjects in the “PE-group” appeared higher than 13.56 (± 3.58) of subjects in the “Self-reported PE-group”; the difference between the two groups was also statistically significant ( $P = 0.00$ ).

The results of univariate analyses showed significant differences in testosterone and the total scores of IPSS, IIEF-15, and OABSS between the subjects in the “PE-group” and the “Non-PE group”; similarly, between the subjects of the “PE-group” and the “Self-reported PE-group”, significant differences were found ( $P < 0.05$ ) in testosterone and the total scores of IPSS, IIEF-15, and OABSS. The subjects, belonging to the “Self-reported PE-group” and the “Non-PE group”, showed statistically significant differences in the total scores of IPSS, IIEF-15, and OABSS ( $P < 0.05$ ) (Table 5).

Multivariate analyses were also conducted wherein statistically significant differences were found with respect to the total scores of IPSS and IIEF-15 between the subjects of the “PE-group” and the “Non-PE group”; statistically significant differences in terms of testosterone and the total score of IIEF-15 were found between the subjects in the “PE-group” and the “Self-reported PE-group” ( $P < 0.05$ ). With regard to the total scores of IPSS and IIEF, statistically significant differences were found between the subjects of the “Self-reported PE-group” and the “Non-PE group” ( $P < 0.05$ ) (Table 6).

Overall, the results of the univariate and multivariate analyses conducted in this study are as summarized in Table 7.

#### 4. Discussion

In this study, PEDT was analyzed as 9.07 (± 2.99), 13.56 (± 3.58), and 17.48 (± 4.06) in “Non-PE group”, “Self-reported PE-group”, and “Self-reported PE-group”, respectively. As a result, as IELT increases, PEDT also shows a statistically significant increase ( $P < 0.05$ ). The consequences can be understood as a correspondence between increases of the IELT and the severity of the PE, and accordingly, the scores of OABSS, IPSS-Total, and sub-questions in each group appeared to be increasing simultaneously in accordance with the increasing severity of PE. Thus, the severity of LUTS

appeared to be increasing significantly in accordance with the increasing severity of PE in this study. Multivariate analyses showed a significant increase in the total score of IPSS of the subjects in the “Self-reported PE-group” and the “PE-group”, compared to the subjects in the “Non-PE group”; however, no significant differences were found between the subjects in the “Self-reported PE-group” and the “PE-group”.

Few studies have reported on the direct correlation between PE and LUTS. In 2012, Um JD, *et al.* reported on the correlation between LUTS and PE in their study conducted with a total of 258 Korean male subjects older than age 40 years; significant correlations between the total score of IIEF-5 and the PEDT score, the total score of IPSS, and IPSS sub-questions were reported [14]. And in 2015, Silangcruz JM, *et al.* in their study conducted with 101 Asian male patients reported that approximately 27% of the patients with

LUTS also had symptoms of PE [6]. In 2014, Chen HR, *et al.* conducted a study with 23 PE patients and reported interestingly the effect of a-blocker agent, which had been commonly used as a therapeutic agent for LUTS, in the treatment of PE [9]. The results suggest the association of the mechanism triggering LUTS with PE indirectly; in this study, the correlation between PE and LUTS was identified as in other studies.

**TABLE 7. Univariate and multivariate analyses of the potential risk factor for premature ejaculation.**

Group Analysis Parameters	PE versus non-PE group				PE versus self-reported PE group				Self-reported PE versus non-PE group			
	Univariate analysis		Multivariate analysis		Univariate analysis		Multivariate analysis		Univariate analysis		Multivariate analysis	
	OR (CI 95%)	P-value	OR	P-value	OR	P-value	OR (CI 95%)	P-value	OR	P-value	OR	P-value
Age (yrs)	1.031 (0.997-1.066)	0.076			1.027 (0.993-1.062)	0.118			1.003 (0.986-1.020)	0.730		
Hypertension	1.135 (0.635-2.028)	0.669			0.977 (0.542-1.760)	0.938			1.162 (0.858-1.574)	0.332		
Diabetes	0.492 (0.114-2.123)	0.341			0.434 (0.100-1.877)	0.264			1.134 (0.649-1.982)	0.659		
BMI (kg/m <sup>2</sup> )	0.947 (0.861-1.041)	0.263			0.933 (0.850-1.025)	0.148			1.020 (0.971-1.071)	0.435		
ANC (X10 <sup>3</sup> /mm <sup>3</sup> )	1.019 (0.855-1.215)	0.833			1.060 (0.841-1.337)	0.621			0.980 (0.879-1.092)	0.712		
Total cholesterol (mg/dL)	0.995 (0.988-1.002)	0.181			0.996 (0.988-1.004)	0.324			0.998 (0.994-1.002)	0.273		
TPSA (ng/mL)	0.981 (0.651-1.219)	0.470			0.892 (0.664-1.199)	0.45			1.020 (0.896-1.161)	0.765		
TRUS (g)	1.009 (0.993-1.024)	0.262			1.008 (0.992-1.024)	0.324			1.003 (0.986-1.021)	0.728		
Testosterone (ng/mL)	1.237 (1.055-1.451)	0.009	1.207 (0.991-1.469)	0.062	1.207 (1.034-1.409)	0.017	1.271 (1.065-1.516)	0.008	1.010 (0.926-1.102)	0.817		
Max flow rate (mL/s)	0.981 (0.953-1.010)	0.190			0.978 (0.949-1.009)	0.159			1.002 (0.993-1.011)	0.669		
Urine volume (cc)	0.999 (0.997-1.002)	0.534			0.999 (0.997-1.001)	0.401			1.000 (0.999-1.001)	0.570		
IPSS Total	1.141 (1.097-1.185)	0.000	1.088 (1.033-1.146)	0.001	1.094 (1.054-1.136)	0.000	1.047 (0.996-1.102)	0.074	1.053 (1.0.0-1.077)	0.000	1.036 (1.007-1.065)	0.013
IPSS-V	1.194 (1.132-1.259)	0.000			1.130 (1.072-1.192)	0.000			1.077 (1.043-1.111)	0.000		

TABLE 7. Continued.

Group Analysis Parameters	PE versus non-PE group				PE versus self-reported PE group				Self-reported PE versus non-PE group			
	Univariate analysis		Multivariate analysis		Univariate analysis		Multivariate analysis		Univariate analysis		Multivariate analysis	
	OR (CI 95%)	P-value	OR	P-value	OR	P-value	OR (CI 95%)	P-value	OR	P-value	OR	P-value
IPSS-S	1.278 (1.171-1.395)	0.000			1.182 (1.084-1.288)	0.000			1.094 (1.038-1.152)	0.001		
QoL	2.144 (1.669-2.752)	0.000			1.799 (1.381-2.242)	0.000			1.307 (1.165-1.465)	0.000		
IIEF-15 total	0.932 (0.917-0.947)	0.000	0.941 (0.925-0.958)	0.000	0.942 (0.927-0.959)	0.000	0.945 (0.928-0.963)	0.000	0.971 (0.961-0.981)	0.000	0.976 (0.965-0.986)	0.000
IIEF-EF	0.881 (0.853-0.909)	0.000			0.896 (0.866-0.927)	0.000			0.949 (0.929-0.970)	0.000		
IIEF-IS	0.724 (0.671-0.781)	0.000			0.747 (0.688-0.812)	0.000			0.883 (0.842-0.926)	0.000		
IIEF-OF	0.739 (0.681-0.803)	0.000			0.778 (0.714-0.848)	0.000			0.909 (0.860 -0.961)	0.001		
IIEF-SD	0.544 (0.465-0.636)	0.000			0.641 (0.549-0.749)	0.000			0.794 (0.732-0.861)	0.000		
IIEF-OS	0.499 (0.426-0.584)	0.000			0.614 (0.530-0.712)	0.000			0.741 (0.677-0.810)	0.000		
PEDT	1.825 (1.592-2.093)	0.000			1.308 (1.207-1.416)	0.000			1.518 (1.427-1.615)	0.000		
OABSS	1.251 (1.130-1.384)	0.000	1.037 (0.894-1.204)	0.629	1.129 (1.026-1.244)	0.013	1.028 (0.898-1.176)	0.690	1.115 (1.045-1.189)	0.001	1.019 (0.941-1.104)	0.644

PE, premature ejaculation; BMI, body mass index; ANC, absolute neutrophil count; TPSA, total prostate-specific antigen; TRUS, transrectal ultrasonography; IPSS, International Prostate Symptom Score; V, voiding; S, storage; IIEF, International Index of Erectile Function score; EF, erectile function; IS, intercourse satisfaction; OF, orgasmic function; SD, sexual desire; OS, overall satisfaction; PEDT, premature ejaculation diagnostic tool; OABSS, overactive bladder symptom score.

Simultaneously, by comparing the respective values of 44.03 ( $\pm$  18.01) and 61.24 ( $\pm$  14.46) of the total scores of IIEF-15 of the subjects in the "PE-group" and the "Self-reported PE-group", with the score of 67.18 ( $\pm$  14.00) of the subjects in the "Non-PE group", the statistically significant increase in the severity of ED according to the increasing severity of PE was identified. These results also identified statistical significance in multivariate analysis; according to the study conducted recently by Kamnerdiri WA, *et al.* with a total of 1,004 male subjects, correlation between ED and PE was reported ( $r = 0.162$ ;  $P < 0.001$ ) [6]. And in this study, the correlations between ED and PE, as well as with the severity thereof, were identified.

Various research analyses have been reported to explain the cause of the correlation between the LUTS and the PE. Sihotang *et al.* analyzed the cause of the correlation between the PE and the LUTS as follows. There are two pathways that could cause both LUTS and PE, which are the defects in the autonomic pathway and the increased sympathetic tone. Defects in the autonomic pathway, caused by several factors, such as neuropathologic disease, alter the functioning of the bladder by decreasing the bladder contraction. Decreased bladder contraction results in LUTS. At the same time, a defect in the autonomic pathway could induce PE. In addition, older age is associated with an increased sympathetic tone, which could aggravate both LUTS and PE [15]. There are several studies that report metabolic syndrome as a cause of LUTS and PE [16, 17]. Lee *et al.* reported that there is a correlation between the occurrence of late-onset hypogonadism and PE [18]. In this study as well as in the comparative analysis of the "PE group" and the "Self-reported PE group" in multivariate analysis, a decrease in testosterone was identified as a risk factor for an increase in PE severity; therefore, further research on this is needed in the future.

This study was conducted by focusing on the identification of statistical significance in differences between variables in each group, thereby resulting in the limited analysis of direct correlations therein. Thus, further studies are suggested to be provided with supplementary analysis on the respective variables to clarify the direct correlations between PE, LUTS, and ED.

## 5. Conclusions

In this study, the correlation between the severity of PE and LUTS was identified, with an increase in the severity of LUTS in patients suffering from PE. The results of this study thus imply that more active examination and treatment should be considered for the treatment in the case of PE patients suffering from LUTS.

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## Conflict of interest

No potential conflict of interest to this article was reported.

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