Lower Likelihood of Having Moderate-to-severe Lower Urinary Tract Symptoms in Middle-aged Healthy Korean Men With Metabolic Syndrome

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OBJECTIVE To investigate the impact of metabolic syndrome (MS) on lower urinary tract symptoms (LUTS) in middle-aged men.

MATERIALS AND METHODS A total of 4256 ostensibly healthy native Korean men aged between 40 and 65 years who voluntarily underwent medical checkup were enrolled. Participants' demographics were collected including International Prostate Symptom Score, various metabolic risk factors, and prostate volume (PV). All participants were stratified into 2 groups based on the presence or absence of MS. The PV was used for subgroup analysis.

RESULTS Data from 4076 men were retrospectively analyzed. The mean age was 52.2 ± 7.4 years and 18.5% of patients were included in the MS group. The MS group had lower frequency score ($P < .01$) compared with the non-MS group. In the larger PV group (≥28 mL), the age-adjusted odds ratio (OR) for having moderate-to-severe LUTS was significantly lower in subjects with MS having 3 metabolic risk factors (hypertension and hypertriglyceridemia included; OR, 0.666; $P < .01$) and in subjects with MS having 4 or 5 risk factors (OR, 0.612; $P < .05$) compared with the non-MS group.

CONCLUSION We confirmed that MS with increasing number of MS risk factors (especially hypertension and hypertriglyceridemia) had favorable effects on the likelihood of having moderate-to-severe LUTS in middle-aged men with larger PV. UROLOGY 84: 665–669, 2014. © 2014 Elsevier Inc.

Middle-aged men often have lower urinary tract symptoms (LUTS).[1] It has been observed that metabolic syndrome (MS) may affect male prostate growth,[2,3] and recently, multiple studies have reported correlations between male LUTS and MS components,[4-7] The aforementioned issue has attracted a certain level of attention because of the expectation that LUTS may improve by controlling modifiable metabolic factors such as diet, exercise, glucose metabolism, and obesity. Some studies involving Western people have revealed that physical activity aimed at reducing MS has shown protective effects against LUTS.[8-10]

However, the association between obesity and LUTS is fraught with complexity. Although some studies revealed a positive association between MS or obesity as represented by body mass index or waist circumference (WC), and LUTS,[4-7] others have reported no significant association between these variables.[11-14] A few studies have even shown an inverse correlation between MS and LUTS,[15-18] meaning, MS itself has a protective effect against LUTS. What makes for totally opposite results from similarly enrolled subjects? Interestingly, the last data were all derived from Asian people.

As the relationship between MS and LUTS in healthy middle-aged men remains unclear, we sought to investigate the impact of MS on LUTS in a specific ethnic population. To our knowledge, the present study is the largest to report on the associations between MS and both prostate volume (PV) and LUTS in the same study population from a specific ethnicity.

MATERIALS AND METHODS

We consecutively enrolled patients aged between 40 and 65 years, who voluntarily underwent a self-paid medical checkup including their prostate evaluation at the Health Promotion

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Table 1. Demographics

	Non-MS (n = 3320)	MS (n = 756)	
Number of MS risk factors	<3	3 (n = 550)	4 or 5 (n = 206)
Age, y	51.9 ± 7.5	53.1 ± 7.3*	53.1 ± 7.1**
BP, mm Hg	123/80 ± 13/10	133/87 ± 13/9*	137/89 ± 11/8**
WC, cm	82.7 ± 6.4	89.6 ± 7.0*	92.0 ± 5.7**
FBS, mg/dL	99.1 ± 18.2	113.8 ± 27.8*	125.6 ± 26.6**
TG, mg/dL	134.0 ± 73.6	215.1 ± 126.2*	253.1 ± 143.8**
HDL, mg/dL	50.5 ± 10.6	43.1 ± 8.8*	40.1 ± 8.6**
PSA, ng/mL	1.22 ± 0.97	1.13 ± 0.90	1.26 ± 1.32
PV, mL	24.5 ± 7.5	26.0 ± 8.1*	26.5 ± 9.3**

BP, blood pressure; FBS, fasting blood sugar; HDL, high-density lipoprotein; MS, metabolic syndrome; PSA, prostate-specific antigen; PV, prostate volume; SD, standard deviation; TG, triglyceride; WC, waist circumference.

P value was analyzed by analysis of variance.

All data were shown as mean ± SD.

*$P < .01$, significant difference between MS (3 risk factors) and non-MS.

**$P < .01$, significant difference between MS (4 or 5 risk factors) and non-MS.

Table 2. Comparison of LUTS between MS and non-MS study patients

Variables	Non-MS (n = 3320)	MS (n = 756)	*P* Value
Total IPSS	8.32 ± 6.10	8.03 ± 5.72	.214
QoL score	2.42 ± 1.26	2.37 ± 1.28	.291
Voiding score	5.30 ± 4.27	5.15 ± 4.04	.359
Storage score	3.02 ± 2.47	2.88 ± 2.47	.163
RUS	1.32 ± 1.31	1.28 ± 1.29	.442
Frequency	1.31 ± 1.19	1.18 ± 1.14	<.01
Intermittency	1.25 ± 1.30	1.22 ± 1.28	.658
Urgency	0.92 ± 1.10	0.85 ± 1.09	.135
Weak stream	1.84 ± 1.43	1.78 ± 1.44	.266
Straining	0.89 ± 1.15	0.87 ± 1.10	.599
Nocturia	0.79 ± 0.89	0.85 ± 0.86	.103

IPSS, International Prostate Symptom Score; LUTS, lower urinary tract symptoms; QoL, quality of life; RUS, residual urine sensation; other abbreviations as in Table 1.

All data were shown as mean ± SD.

P value was analyzed by independent *t* test.

Center of the Seoul Soonchunhyang Hospital from 2012 to 2014. A total of 4256 ostensibly healthy native Korean men were enrolled in this retrospective study. All men underwent detailed clinical evaluations with the International Prostate Symptom Score (IPSS) questionnaire. Anthropometric measurements, including height, weight, and WC, were determined. A blood sample was obtained for serum prostate-specific antigen level measurement (AxSYM, Abbott Laboratories, Abbott Park, IL). Thereafter, a digital rectal examination and transrectal ultrasonography scan were performed. The exclusion criteria were the use of medications affecting LUTS (such as α-adrenergic blockers, anticholinergics, or 5-α-reductase inhibitors), serum prostate-specific antigen level of >3.0 ng/mL, abnormal findings on the digital rectal examination, pyuria, the presence of neurogenic bladder dysfunction, confirmed prostate cancer, prostatitis, and previous surgical intervention related to benign prostatic hyperplasia.

The definition of MS, according to the recent consensus report of the National Cholesterol Education Program's Adult Treatment Panel III,[19] is the presence of ≥3 of the following risk factors: (1) WC >90 cm (for Asian population), (2) fasting blood sugar >100 mg/dL, (3) serum triglyceride (TG) level >150 mg/dL, (4) hypertension (HiBP); systolic blood pressure >130 mm Hg or diastolic blood pressure >85 mm Hg, and (5) high-density lipoprotein cholesterol level <40 mg/dL. According to the total IPSS, patients were categorized as mild symptom group (<8 points), or moderate-to-severe symptom group (≥8 points).[20]

Statistical Analysis

Differences between groups in continuous variables were analyzed using the independent *t* test, analysis of variance, and presented as mean and standard deviation, whereas differences in categorical variables were analyzed using the chi square test. The results of the IPSS evaluation were further stratified by the PV, using the mean values as the cut-off points. Multivariate regression analysis was used on estimating odds ratio (OR) for the moderate-to-severe LUTS group according to the number of components of MS. We used the Breslow-Day test for homogeneity of ORs across the risk strata. A *P* value <.05 was considered statistically significant. All analyses were performed with commercial statistical software (SPSS version 13.0 for Windows, SPSS, Chicago, IL).

RESULTS

Data from the 4076 men were analyzed. Among them, 756 patients (18.5%) had MS and formed the study group. The remaining 3320 (81.5%) MS-negative patients formed the control group.

Table 1 lists the clinical and demographic characteristics of all study patients. The mean age of patients with MS was significantly higher than those without MS. The PV, by transrectal ultrasonography, was also significantly larger in the MS group patients than those in the non-MS group. Table 2 compares the LUTS between the MS and