



Investigation the Relationship of Lower Urinary Tract Symptoms with Vascular Risk Factors

Soner Coban¹, M.Sakir Altuner², Soner Cander³, Ali Riza Turkoglu¹, Muhammet Guzelsoy¹, Ozen Oz Gul³, Ali Tekin⁴

¹ Sevket Yilmaz Education and Research Hospital, Urology, Bursa, Turkey

² Sevket Yilmaz Education and Research Hospital, Internal Medicine, Bursa, Turkey

³ Sevket Yilmaz Education and Research Hospital, Endocrinology and Metabolism, Bursa, Turkey

⁴ Düzce University Medical School, Urology, Düzce, Turkey

Abstract

Our aim was to investigate the relationship between lower urinary tract symptoms (LUTS) in terms of vascular risk factors include diabetes. In a prospective study, a total of 116 men aged 40 years or more who presented to the outpatient clinics of urology or endocrinology between January 2012 and April 2013 were included. After receiving a detailed medical history, fasting blood glucose, serum lipids including total cholesterol, HDL and triglyceride, HbA1c, creatinine, total testosterone and total prostate-specific antigen were measured. Urinalysis and uroflowmetry were done. Postvoiding residual urine and prostate volume were measured by suprapubic ultrasonography. International Prostate Symptom Score (IPSS) of the patients were determined. Existence of vascular risk factors including hypertension, hyperlipidemia, diabetes mellitus, coronary artery disease and obesity as well as age, body mass index (BMI), weight, waist circumference and body fat percentage values were recorded. Of the patients, 41 (35.3%) had hypertension, 54 (46.6%) dyslipidemia, 68 (58.6%) diabetes mellitus, 34 (29.3%) coronary artery disease and 39 (33.6%) obesity. When the patients were grouped according to the presence of the risk factors (no risk [14 patients], mild to moderate [1-2 risk factor] [65 patients] and severe [3 or more risk factors] [37 patients]), there was no a significant difference among the groups in terms of IPSS ($p = 0.76$). The results of this prospective study show that vascular risk factors and diabetes may not be related to LUTS

Key words: Lower urinary tract symptoms, vascular diseases, aging, diabetes

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Corresponding Author: Soner Cander, Sevket Yilmaz Education and Research Hospital, Department of Endocrinology and Metabolism, 16230 Yildirim, Bursa, Turkey

E-mail: drcander@gmail.com **Phone:** +90 224 295500

Introduction

The prevalence of both lower urinary tract symptoms (LUTS) and vascular risk factors (diabetes, hypertension, dyslipidemia, coronary artery disease and obesity) increases together with significant health problems with age and negatively affects the quality of life. Studies have revealed the presence of moderate or severe LUTS in one out of every three or four men over the age of 40. Taking into account that the life expectancy is increasing, it is clear that these rates are increasing along with the elderly population [1-3].

Benign Prostatic Hyperplasia (BPH) is a health problem that becomes more prevalent with age and is the most common cause of LUTS. LUTS consist of three main parts: symptoms regarding urine storage (increased daytime frequency, nocturia, urgency, and incontinence), symptoms related to urinary evacuation (weak and/or interrupted flow, delayed urine initiation, having to force oneself to urinate, and terminal dribbling), and symptoms after urination (feeling of incomplete evacuation of bladder, dripping after urination) [4].

In this study, we aimed to investigate the relationship of vascular risk factors such as hypertension, diabetes mellitus, dyslipidemia, coronary artery disease and obesity with LUTS which has become a public health problem.

Material and Method

Patients and the study protocol

116 male patients with an age ranged from 44 to 73 years who presented at the Urology or Endocrinology outpatient clinics of Şevket Yılmaz Education and Research Hospital in Bursa, Turkey, between January 2012 and April 2013 were included in the study. The trial was conducted in accordance with the Declaration of Helsinki and Good Clinical Practice principles and approved by the local ethics committee of Uludağ University Medical School. Written informed consent was obtained from all participants before enrolment.

Inclusion criteria for the study were identified male patients aged 44 years or older and mentally suitable for research. Individuals who had a history of chronic obstructive pulmonary disease, urogenital system tumor, urogenital surgery, and neurogenic bladder, , kidney and liver failure,

urethral stricture, bladder stones, overactive bladder, and chronic prostatitis were excluded from the study.

Full urine examination and microscopy, serum lipids (total cholesterol, HDL and triglyceride) levels, HbA1c (in diabetic patients), fasting blood glucose, serum levels of creatinine, total prostate-specific antigen (PSA) were measured. Body mass index (BMI) and body fat percentages of the patients were recorded with a body analysis on the TANITA SC 330 device (Tanita Corporation, Maeno-cho. Itabashi-ku, Tokyo, Japan.)

The files of the patients were examined in detail and risk factors were determined with the help of the history taken from the patient and the relatives. Accordingly, the patients who used antihypertensives or had systolic blood pressure (BP) over 140 mmHg and diastolic BP 90 mmHg during their follow-up were recorded as hypertensive, and patients with a history of myocardial infarction and coronary artery by-pass intervention and had ischemic findings during their latest stress electrocardiography, echocardiography or coronary angiography were recorded as coronary artery disease patients. Patients who were treated for diabetes and had fasting blood glucose levels above 125 mg/dl and postprandial blood glucose levels above 200 mg/dl in their recent tests were considered diabetic. Hyperlipidemia was recorded according to the lipid levels or history of antilipidemic drug use. Obesity was recorded as a risk factor in patients with BMI over 30 kg/m².

Patients were divided into 3 groups according to their risk factors. Accordingly, 14 patients with no risk factor were classified as group 1, 65 patients with 1 or 2 risk factors as group 2 and 37 patients with 3 or more risk factors as group 3.

All patients underwent uroflowmetric examination during which maximum flow per second (Q_{max}), average flow per second (Q_{mean}), voided volume and residual urine measured by suprapubic ultrasonography were recorded. Prostate volume was measured by suprapubic ultrasonography. International Prostate Symptom Score (IPSS) values for each participant were also noted. The patients were grouped as mild (0-7), moderate (8-19), and severely symptomatic (20-35) according to their IPSS scores. In addition, a limited neurological examination including digital rectal examination was performed for all patients.

Statistical analysis

Statistical analyses were performed using SPSS version 15.0 (SPSS, Inc., Chicago, IL) software. Compliance of the variables with the normal distribution was investigated with visual (histogram and probability graphs) and analytical (Kolmogorov-Smirnov test) methods. Descriptive analyses were with mean $\pm$ standard deviation and (min-max) values for normally distributed variables. Relations between the various parameters and the IPSS values were determined using Spearman and Pearson correlation tests, Student t-test, the Mann-Whitney U test and Kruskal-Wallis test. The independent effects of different parameters on IPSS were investigated by using the multivariate linear regression model. $P < 0.05$ was accepted as statistically significant.

Results

The mean age of the 116 patients included in the study was 57 ± 6 (44-73) years. The mean ages of the patient groups according to risk factors were similar ($p = 0.21$). A total of 41 (35.3%) patients had hypertension, 54 (46.6%) dyslipidemia, 68 (58.6%) diabetes mellitus, 34 (29.3%) coronary artery disease and 39 (33.6%) obesity. The patients were divided into 3 groups as mild, moderate and severe LUTS, according to IPSS values. There were seventy-three, thirty-nine and four patients in these groups respectively (Table 1).

When our patients were separated into 3 groups based on five vascular risk factors, the age groups were similar to each other. There was no significant difference among the groups in terms of IPSS scores. Similarly, no significant difference was found between prostate volume, Qmax, life quality and testosterone levels (Table 2) (Figure 1).

When the patients were grouped according to 5 risk factors, there was no significant difference among the groups in terms of IPSS ($p = 0.76$). When all the risk factors were evaluated individually in terms of IPSS, nocturia was significantly high ($p = 0.003$) in diabetic patients.

Table 1. Clinical characteristics

	No. patients (%)
Age (years)	
40-49	11 (9.5)
50-59	66 (57.0)
60-69	37 (32.0)
70-79	2 (1.5)
IPSS	
0-7 (mild))	73 (62.9)
8-19 (moderate)	39 (33.6)
20-35 (severe)	4 (3.3)
No. vascular risk factors	
No risk	14 (12.1)
1-2	65 (56.0)
3 or more	37 (31.9)
Diabetes mellitus	68 (58.6)
Hyperlipidemia	54 (46.6)
Hypertension	41 (35.3)
Coronary artery disease	34 (29.3)

IPSS: International Prostate Symptom Score; BMI: body mass index

Table 2. Clinical and laboratory variables

	Group 1 (n = 14)	Group 2 (n = 65)	Group 3 (n = 37)	P value
Age (years)	56 ± 7	56 ± 6	58 ± 6	0.21
IPSS	6.7 ± 6.0	6.9 ± 5.9	7.8 ± 6.7	0.76
Nocturia	1.4 ± 1.2	1.5 ± 1.2	1.9 ± 1.5	0.1
Qmax (mL/sec)	14 ± 12	15 ± 10	13 ± 9	0.74
Voided volume (mL)	333 ± 211	326 ± 216	311 ± 211	0.77
Prostate volume (mL)	48 ± 29	41 ± 22	42 ± 17	0.69
Cholesterol (mg/dL)	161.7 ± 52.3	200.1 ± 47.6	202.1 ± 41.6	0.008
HDL (mg/dL)	39 ± 13.3	44.2 ± 11.7	44.7 ± 9.3	0.54
Triglyceride (mg/dL)	116.1 ± 71.1	172.4 ± 96.6	162.4 ± 88.7	0.08
Total PSA	1.0±0.5	1.1±0.9	1.2±0.8	0.48

Group 1: No risk factor; Group 2: Mild to moderate; Group 3: Severe; IPSS:International Prostate Symptom Score, Qmax: Peak urine flow rate.

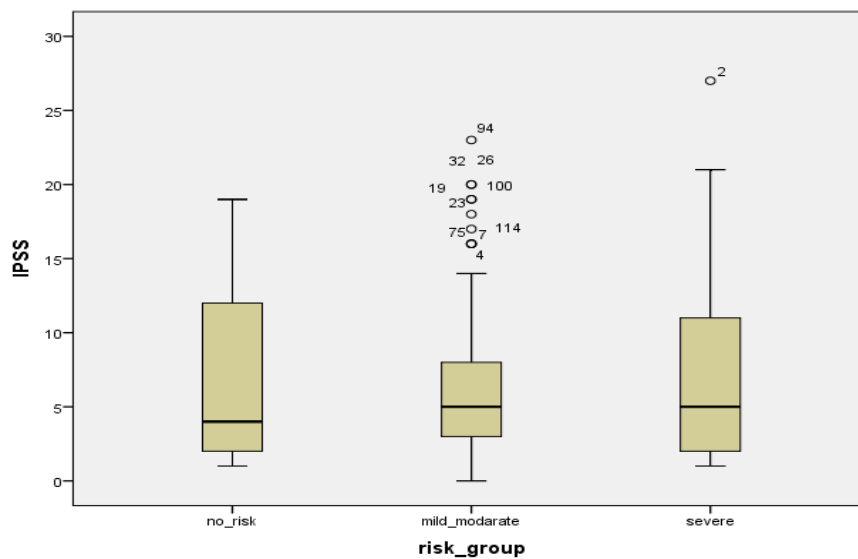


Figure 1. Box-plot diagram of the IPSS values

Discussion

LUTS is an extremely important public health problem that increases with aging. The major cause is BPH. Taking into account that the life expectancy is increasing, it is clear that its importance will also increase. Studies have found 20% of men over the age of 50 to have at least moderate LUTS [5].

The relationship of chronic diseases with LUTS was revealed in recent studies. However, clear and reliable data could not be obtained due to the increasing incidence of these diseases with age. While chronic diseases were found to be a risk factor for LUTS in some studies, no such connection was established in others. In the pathogenesis of LUTS there are several factors associated with chronic diseases such as structural changes of the urinary bladder, infection, comorbidity, medication, changes in fluid metabolism, neurologic factors, and hormonal changes. The role of atherosclerosis is unclear. Atherosclerosis induced pelvic ischemia caused functional and structural alteration of the detrusor in animal models [6-7]. Potential impacts of vascular risk factors to LUTS in humans are contradictory in the studies [8-10]. Grouping of the vascular risk factors are not standardized. For example some of them are not included the hyperlipidemia. In our study we investigated five risk factors (diabetes mellitus, hypertension,

hyperlipidemia, obesity and previous cardiovascular disease) with separated into three groups by the number of risk factors. There were no difference in the LUTS values of three groups and when evaluated in the each risk factor, except higher nocturia scores in the diabetic patients due to hyperglycemia.

It is commonly accepted that diabetes can cause bladder dysfunction due to autonomic neuropathy through the functional parasympathetic pathway. A further decrease in detrusor function leads to decreased maximal flow rate while bladder outlet obstruction causes increased postvoiding residual urine volume [11]. Although the urine volumes and residual urine amount of diabetic patients in the uroflowmetry study was significantly higher in our study, there was no significant difference in IPSS scores except for nocturia. The reason is probably the current fasting blood glucose level not being diagnostic in diabetes mellitus and being already low in patients treated for diabetes. When the prostate volumes and PSA values of those with and without DM were compared, there was no statistically significant difference.

A similar study by Demir et al on a total of 190 patients with a mean ages of 59.7 years found obesity, hypertension, elevated fasting blood glucose and hypertension to contribute only to the development of severe LUTS (in the group with IPSS of 20-35) [12]. However, the study by Aktas et al in our country did not find a relationship between the metabolic syndrome and IPSS [13]. Although some studies conducted in other countries suggest a linkage of chronic conditions such as hypertension or diabetes with clinical BPH, we believe that the majority of the patients were found to be adversely affected by such an association because these conditions often occur in aging men [11,14]. There was no strong evidence showing that smoking, obesity or excess alcohol intake are risk factors in the development of BPH in another study [15]. The results of different epidemiological studies are contradictory, probably due to the different methods of sampling and analysis. Only marginal differences are usually found. Although these studies overlap with ours, Kim et al concluded in 2010 that men with vascular disease risk factors were more likely to have LUTS [16].

The limitations of our study were the relatively small number of patients in general, and the high number of patients with diabetes as the study was conducted jointly with the endocrinology department. However, we could not find a significant difference regarding IPSS scores in the group with and without diabetes, and the group with vascular disease.

In conclusion, we found that vascular risk factors (hypertension, dyslipidemia, diabetes, coronary artery disease, BMI) do not affect LUTS.

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Conflict of interest: None

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