Alcohol Consumption Shows a J-Shaped Association With Lower Urinary Tract Symptoms in the General Screening Population

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Abbreviations and Acronyms

BMI = body mass index

BPE = benign prostatic enlargement

CHD = coronary heart disease

HDL = high-density lipoprotein

I-PSS = International Prostate Symptom Score

LUTS = lower urinary tract symptoms

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Study received institutional review board approval.

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Purpose: Controversial and contradictory data on the association between alcohol consumption and lower urinary tract symptoms are currently available in the literature. In this study we determined the association between alcohol consumption and lower urinary tract symptoms, including voiding and storage symptoms, in a large general screening population.

Materials and Methods: This cross-sectional study included 30,196 men 30 years old or older participating in a comprehensive health evaluation at the Seoul National University Hospital Healthcare System Gangnam Center. Men with a history of prostate related medical problems such as prostate cancer, prostate surgery or prostatitis were excluded from study. Using the International Prostate Symptom Score, lower urinary tract symptoms were defined as a score of 8 or greater, indicating moderate to severe symptoms. We used logistic regression analysis to determine the association between alcohol consumption and lower urinary tract symptoms.

Results: After adjustment for eligible covariates, graphing of the association between alcohol consumption and the risk of moderate to severe lower urinary tract symptoms showed a J-shaped curve. Compared with nondrinkers, the odds ratios of moderate to severe lower urinary tract symptoms were 0.91 (95% CI 0.84–0.98) in men who drank 0 to 10 gm daily and 1.19 (95% CI 1.07–1.33) in those who drank 40 or more gm daily. This is a cross-sectional study with data from self-reported alcohol consumption and, therefore, the reported amounts of alcohol consumption might be underestimated.

Conclusions: To the best of our knowledge this is the largest population based study to evaluate the relationship between alcohol consumption and moderate to severe lower urinary tract symptoms, including voiding and storage symptoms. In men alcohol consumption shows a J-shaped curve relationship with the risk of moderate to severe lower urinary tract symptoms.

Key Words: alcohol drinking, questionnaires, urinary tract

The prevalence of lower urinary tract symptoms in men increases with age.[1] Moreover LUTS often have a significant negative impact on patient quality of life. Benign prostatic enlargement is thought to be a common cause of LUTS but not all men with symptoms have an enlarged prostate.[2] Despite the high prevalence of LUTS, not much is known about the causes. Previous theories have postulated that LUTS are caused by nonmodifiable factors such as sex steroid hormones, genetic predisposition and aging.

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Recently systemic metabolic disturbances have been regarded as risk factors for LUTS.[3] Parsons et al reported that many of the same metabolic perturbations that increase the risk of cardiovascular disease such as obesity, diabetes and dyslipidemia also increase the risk of LUTS.[4,5]

Because lifestyle factors modulate systemic metabolic disturbances, in turn altering the risk of cardiovascular disease, it is plausible that lifestyle factors may also affect the risk of LUTS.[3,6] Alcohol consumption as a lifestyle factor might contribute to the risk of LUTS. However, few studies have investigated the association of alcohol consumption with LUTS. There have been 2 studies that reported a positive association,[6,7] whereas an inverse association has also been reported.[8–10] These studies were limited to small sample sizes,[7,8] were not corrected for various confounding factors[6] and did not investigate a general population[10] or specific urinary symptoms such as nocturia.[9] In the current study we evaluated the association between alcohol consumption and LUTS in a large, general population. Furthermore, we adjusted the results from our study for various specific confounding factors.

SUBJECTS AND METHODS

Study Population

Eligible subjects were men 30 years old or older who underwent routine comprehensive health evaluations from November 2003 to February 2010 at the Seoul National University Hospital Healthcare System Gangnam Center. All subjects provided written informed consent and the institutional review board approved the protocol. A self-administered medical questionnaire collected previous and current health status information, and a family physician conducted a medical interview and basic physical examination. Questionnaires included information on LUTS (I-PSS), smoking behavior, alcohol use, history of cancer and other diseases, and use of select drugs. We excluded from study men who had a history of prostate related medical problems such as prostate cancer, prostate surgery or prostatitis, or those taking an antiandrogen (1,864). A total of 30,196 men were included in this study.

Measurements

LUTS were assessed according to the I-PSS on a self-administered questionnaire. The I-PSS consists of a 7-item questionnaire that evaluates specific components of LUTS. Individual items are scored from 0 to 5, the individual I-PSS question scores are summed, and the overall symptom score is categorized as none to mild (0 to 7 points), moderate (8 to 19 points) or severe (20 to 35 points) symptoms.[11] We further classified men according to the presence of moderate to severe voiding (obstructive) symptoms (5 or more out of 20 points for the sensation of incomplete bladder emptying, stopping and starting several times during urination, a weak urinary stream, and pushing or straining to begin urination) and moderate to severe storage (irritative) symptoms (4 or more out of 15 points for having to urinate less than 2 hours after voiding, finding it difficult to postpone urination and number of instances of getting up to urinate each night).[7]

Current alcohol drinkers who consumed alcoholic beverages on a weekly basis were asked about the frequency and amount of consumption per occasion of 4 alcoholic beverages, ie soju (a Korean distilled beverage), beer, whiskey and wine. For an estimation of the total alcohol intake in gm per day, servings of specified types of alcoholic beverages were multiplied by gm per serving (soju 8.5 gm per serving, beer 9.9 gm per serving, wine 8.9 gm per serving, whiskey 9.9 gm per serving). Daily ethanol intake was calculated from answers to these questions as well as ethanol content in each beverage. The subjects were categorized as nondrinkers, or as current drinkers who consume 0 to 10, more than 10 to 20, more than 20 to 30, more than 30 to 40, or 40 or more gm ethanol daily.[12]

Weight and height were measured at the clinic examination using a standardized protocol. BMI was calculated as weight in kilograms divided by the square of height in meters, and categorized as less than 23, 23 to 24.9 and 25 kg/m^2 or greater. This BMI classification was determined according to the WHO Asia-Pacific criteria.[13]

Statistical Analysis

Subjects were stratified into 4 different 10-year age groups (ie 30 to 39, 40 to 49, 50 to 59 and 60 years or older). The prevalence of moderate to severe LUTS (in total) and of voiding and storage symptoms was determined for each age, alcohol consumption, BMI, smoking status and medical history group. The chi-square test was performed to assess trends across ordered categories. Logistic regression was used to calculate the OR and 95% CI of LUTS to alcohol consumption. In the logistic regression models we adjusted for age only, and further included in the models BMI, smoking status and medical history. All analyses were performed with Stata® software (Version 10.0).

RESULTS

General descriptive characteristics of the 30,196 men in the study are summarized in table 1. Overall 28.4% of the men reported having moderate to severe LUTS. Of the study population 83.7% currently consumed alcohol, 34.9% were current smokers and 41% were classified as being obese (BMI 25 kg/m^2 or greater). Overall 15.1% of the men reported a history of hypertension, 5.2% a history of heart disease and 2.9% diabetes.

Table 2 shows the prevalence of moderate to severe LUTS (in total) and of voiding and storage symptoms according to age, alcohol consumption, BMI, smoking status and medical history. The prevalence of moderate to severe LUTS increased with age ($p < 0.001$). In addition, the proportion of men with moderate to severe voiding and storage symptoms increased with age ($p < 0.001$). The prevalence of moderate to severe LUTS was lowest among men drinking 20 to 30 gm daily in our 6-category classi-