

Influence of diet quality on lower urinary tract

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Abstract

There is relative paucity of literature evaluating the association between diet and lower urinary tract symptoms (LUTS). The goal of the study was to evaluate the association between dietary quality and the prevalence of LUTS. Our hypothesis was that healthy balanced diet would be associated with lower LUTS. Research comprised 852 patients aged >40 years of which 724 (85%) completed urinary questionnaire. We used bivariate analysis to examine rate of LUTS among men with poor vs. good diet. Multivariate regression analysis was applied to determine impact of demographic samples in men with and without LUTS and controlling for age, urban/rural population, smoking status, diabetes, alcohol intake, obesity and exercise. After exclusion of 31 men with prostate cancer, our study included 693 men, of whose 139 (20%) reported at least one symptom suggestive of LUTS (63 irritative, 46 obstructive and 30 both symptoms). Men with LUTS were more likely to be rural ($p<0.0001$), nonsmoker ($p<0.0001$), to have diabetes ($p<0.0001$), to be older ($p<0.0001$), to have higher PSA ($p<0.0001$), and to have diagnosis of enlarged prostate ($p<0.0002$). Moderate and vigorous physical activity and alcohol intake were more common in men without LUTS ($p<0.0001$). We observed higher rates of LUTS among men with poorer dietary intake of dairy (22.4% vs. 16.4%) ($p=0.0013$), and among men with poor protein intake (24.6% vs. 17.95%) ($p=0.012$), as well as among those with overall poor diet (25.8% vs. 17.8%) ($p=0.001$) and with little dietary variety (26.1% vs. 17.6%) ($p=0.001$). On multivariate study, an unhealthy diet, rural population and older men were associated with higher LUTS degree, whereas alcohol intake was protective from LUTS. This study demonstrated that poor diet quality was independently associated with patient-reported LUTS.

Key words: lower urinary tract symptoms, diet, risk factors.

Uticaj kvaliteta ishrane na simptome donjih partija urotrakta

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Apstrakt

Postoji relativno malo podataka u literaturi koji imaju za cilj procenu korelacije između kvaliteta ishrane i simptoma donjih partija urotrakta (SDPU). Cilj ove studije je da proceni povezanost između kvaliteta ishrane i SDPU. Naša hipoteza je bila da je izbalansirana zdrava ishrana udružena sa manjom učestalošću SDPU. Studija obuhvata 852 pacijenata starosti >40 godina od kojih je 724 (85%) kompletiralo urinarni upitnik. Primenjena je bivarijantna analiza da se ispita stepen SDPU kod pacijenata sa dobrom i lošom ishranom. Multivarijantna regresiona analiza je primenjena da se proceni uticaj demografskih faktora kod pacijenata sa ili bez SDPU u zavisnosti od godina starosti, pušenja, dijabetesa, konzumiranja alkohola, gojaznosti i fizičke aktivnosti. Pošto smo isključili iz analize 31 pacijenta sa karcinomom prostate, naša studija je obuhvatala 693 muškaraca od kojih je 139 (20%) imalo najmanje jedan simptom indikativan za SDPU (63 iritativne, 46 opstruktivne i 30 oba simptoma). Veća verovatnoća za pojavu SDPU je postojala kod seoske populacije ($p<0.0001$), nepušača ($p<0.0001$), dijabetičara ($p<0.0001$), starijih muškaraca ($p<0.0001$), sa višim PSA ($p<0.0001$) i dijagnozom uvećanja prostate ($p<0.0001$). Umerena i intenzivna fizička aktivnost i unos alkohola su bili češće zastupljeni kod muškaraca bez SDPU ($p<0.0001$). Nadjena je veća učestalost SDPU kod muškaraca sa malim unosom mlečnih proizvoda (22.4%:16.4%) ($p=0.0013$), oskudnim unosom proteina (24.6%:17.9%) ($p=0.012$), generalno lošom ishranom (28.2%:17.8%) ($p=0.012$) i malom raznolikošću ishrane (26.1%:17.6%) ($p=0.001$). Multivarijantna analiza je pokazala da nezdrava ishrana, seoska populacija i stariji muškarci imaju veći rizik za pojavu SDPU, dok je unos alkohola imao protektivno dejstvo na SDPU.

Ključne reči: simptomi donjih partija urotrakta, ishrana, faktori rizika

Introduction

There is a relative paucity of literature evaluating association between diet quality and LUTS, and the findings of these studies are heterogenous and conflicting. Investigators are increasingly interested in the relationship between environmental/lifestyle and LUTS. For example, obesity, stress¹, and type II diabetes, all linked to lifestyle, also appear to be associated with an increased the risk of developing LUTS. Conversely, a healthier lifestyle with higher levels of exercise and moderate drinking, appear to decrease the risk of LUTS³. Although the causal pathway remains uncertain, it has been hypothesized that a healthier lifestyle may lower the incidence of LUTS through the effect on sympathetic tone, androgen levels and inflammation⁴.

The relationship between our individual diets, perhaps our most modifiable and unique lifestyle factor, and urinary symptoms remain ill defined. Although clinicians commonly hypothesis an association between the typical american diet and LUTS⁵, empirical data are limited with most of the existing studies reaching inconclusive or contradictory findings⁵⁻⁷.

The aim of the present study was to evaluate the association between dietary quality and the prevalence of lower LUTS. We hypothesized that a healthy balanced diet would be associated with fewer urinary symptoms.

Material and methods

Research comprised 851 patients requiring urological care aged > 40 years of which 724 (85%) completed International Prostate Symptom Score (IPSS) urinary questionnaire between January 2010 and December 2012. Dietary quality was assessed using the 10 component United States Department of Agriculture (USDA) Healthy Eating Index (HEI). We used bivariate analysis to examine rates of LUTS among men with poor vs. good diet. Multivariate logistic regression analysis was used to calculate odds ratios (ORs) after sample weights and controlling for age, urban/rural population, smoking status, diabetes, alcohol intake, obesity and exercise.

Results

After exclusion of 31 men with prostate cancer, our study finally included 693 men, of whom 139 (20%) reported at least one symptom suggestive of LUTS, with mean age of 59.1±13.2 years (63 irritative, 46 obstructive and 30 both symptoms) (Table 1.).

	No LUTS(N=554)	LUTS (N=139)	P
Age (mean, SD)	58.2±12.9	63.0±13.4	<0.0001
Urban/Rural (%)			
Urban	81.8	64.05	<0.0001
Rural	18.2	35.95	
Current smokers (%)	31.17	28.29	<0.0001
Diabetes (%)	9.79	18.26	<0.0001
Alcohol intake (> 1 drink per week)	73.86	58.95	<0.0001
BMI (kg/m ²)	28.1±5.0	28.4±5.4	0.16
PSA (ng/ml)	1.70±2.54	2.98±7.0	<0.0001
Enlarged prostate diagnosis (%)	11.3	24.4	<0.0001
Moderate exercise (%)	38.1	26.7	<0.0001
Vigorous exercise (%)	54.5	44.74	<0.0001

Table 1. Characteristics of patients without and with LUTS

Men with LUTS were more likely to be either rural, nonsmokers, to have diabetes, to be older, to have higher PSA and to have diagnosis of enlarged prostate. Moderate and vigorous physical activity and alcohol intake were significantly more common in men without LUTS (Table 2).

	No urinary symptoms (mean, 95% CI)	One or more urinary symptoms (mean, 95% CI)	P*
Overall HEI	630(62.2-63.7)	60.8(53.1-62.4)	0.03
Cholesterol	6.8(6.5-7.1)	6.3(5.8-6.9)	0.18
Dairy	5.8(5.5-6.0)	4.9(4.4-5.4)	0.005
Fat	6.2(6.0-6.4)	6.1(5.6-6.5)	0.59
Fruits	3.9(3.7-4.2)	3.7(3.2-4.1)	0.37
Grain	6.4(6.3-6.6)	6.5(6.1-6.8)	0.78
Saturated fat	6.9(6.7-7.1)	6.6(6.2-7.1)	0.42
Sodium	5.1(4.8-5.3)	5.8(5.3-6.3)	0.02
Variety in diets	8.0(7.8-8.1)	7.4(7.0-7.8)	0.02
Vegetables	6.3(6.1-6.5)	6.1(5.7-6.5)	0.48

All results are calculated using sample weights.

* P values calculated using unpaired t tests. P<0.05 indicated statistical significance

Table 2. Healthy Eating Index scores in men without and with LUTS: bivariate analysis

Men with LUTS consumed less dairy products, and has less variety in their products, and overall, had significantly less nutritious diets by USDA standard (Table 3.).

	Needs			P value*
	Poor (%)	Improvement (%)	Good (%)	
Overall HEI	28.6	18.6	17.8	0.015
Cholesterol	22.3	18.0	18.8	0.14
Dairy	22.4	19.2	16.4	0.013
Fat	20.4	18.9	19.6	0.62
Fruits	20.7	20.7	17.3	0.21
Grain	21.8	18.0	19.8	0.43
Proteins	24.6	19.8	17.9	0.012
Saturated fat	22.7	14.8	19.8	0.34
Sodium	18.2	18.6	22.4	0.17
Dietary variety	26.1	21.2	17.6	0.001
Vegetables	20.9	22.3	17.8	0.20

All percentage were calculated using sampling weights.

* USDA dietary categories: poor (total score <50; component score <5); improvement (total score 50-80; component score 5-8); and good (total score >80; component score >8)

*Mantel extension chi-squared test for trend (p≤ 0.05 indicated statistical significance.)

Table 3. Prevalence of LUTS by USDA dietary category*

We observed a significantly higher prevalence of LUTS among respondents with poor overall diet, poor protein intake, and poor dietary variety (Table 4.).

Model variables	OR (95% III)	P value
Age > 60 years	2.4 (1.6-3.1)	<0.0001
Population		
Rural	2.8 (2.0-4.0)	<0.0001
Diabetes	1.4 (0.8-2.5)	0.24
Alcohol	0.67 (0.48-0.93)	0.015
Smoking (current)	0.95 (0.66-1.36)	0.77
Excercise	0.76 (0.46-1.25)	0.28
BMI	1.1 (0.71-1.70)	0.67
Overall HEI	1.74 (1.05-2.90)	0.031
Cholesterol	1.36 (1.00-1.83)	0.51
Dairy	1.31 (0.78-2.20)	0.31
Fat	1.11 (0.66-1.88)	0.69
Fruits	1.39 (0.78-2.50)	0.27
Grain	1.02 (0.61-1.70)	0.94
Meat	1.10 (0.75-1.59)	0.63
Saturated fat	1.18 (0.74-1.87)	0.49
Sodium	0.72 (0.44-1.18)	0.19
Variaty	1.34 (0.89-2.02)	0.16
Vegetables	1.13 (0.72-1.28)	0.59

Table 4. Multivariate logistic regression analysis

After controlling for age, urban/rural population, diabetes, alcohol intake, BMI, excercise and smoking, the OR of LUTS in those with a least healthy diet was 1.74. Alternatively, in our adjusted analyses, there was no statistically significant association between any of the 10 dietary subscales and LUTS. We also observed greater odds of LUTS among unhealthy diet, rural population, older patients, whereas alcohol intake was slightly protective from LUTS.

Discussion

In this cross-sectional study of the Serbian population we found that a healthier diet was associated with lower self-reported LUTS in men over the age of 40 years. Alternatively, we found no evidence that any individual food group appeared to be protective from LUTS. We also found evidence of greater self-reported LUTS in rural population, older men and slightly reduced LUTS in patients who consumed alcohol.

A 2008 study by Kristal et al. that analyzed the incident cases of BPH among patients assigned to the placebo arm of the prostate cancer prevention trial found that a diet that included moderate alcohol intake and was high in potein and vegetables and low in fat and red meat was protective for LUTS⁸. A study by Chyon et al. found that beef intake slightly increased the risk of LUTS, although analysis of 32 other food groups found no increased risk⁹. Analysis of the Health Professional Follow-up Study found that vegetable intake was inversely correlated with LUTS but other food groups showed no strong association¹⁰. In other studies, starch, vegetable consumption, fat consumption, and poultry have shown to increase the risk of BPH and LUTS, whereas others have shown vegetables and unsaturated fats to be protective from LUTS¹¹⁻¹⁵. The heterogenous patient populations, definitions used for LUTS, and analytic methods used make it difficult to draw any clear conclusions.

We used the HEI score generated from the National Health and Nutrition Examination Survey (NHANES) 24-hour dietary data. Use of the HEI has many advantages. First, the HEI uses an easily interpretable scoring system based on adherence to USDA dietary recommendations that precorrects for such factors as total caloric intake, body size, and individual recommended serving amount. This makes comparison of the numbers between subgroups potentially easier. Second, the scores have been shown in other studies to correlate with the development of chronic diseases, most importantly cardiovascular disease¹⁶. Third, unlike other dietary studies that analyze individual components of diet for correlation with disease, the HEI is intended to analyze the overall healthiness of the study participant's diet. Although this can be viewed as a weakness of using the HEI, as it does not easily allow one to study the effects on manipulating one dietary variable to lower LUTS (ie, studying the increase in vegetable consumption), use of the overall HEI may represent a more real-world dietary situation, in which increasing and decreasing a single dietary component may not be expected to influence disease processes of the overall diet remains poor.

How diet affects the development of LUTS is unclear, but there are potential mechanisms that have been proposed. Oxidative stress within the prostate that have been shown to increase the development of BPH¹⁷; thus healthier foods with higher level of antioxidants may decrease LUTS. The relationship has been described in a previous observational study where diets rich in antioxidants obtained from vegetable, namely beta-carotene, lutein, and vitamin C, protected participants from LUTS¹⁸. The autonomic nervous system can also be influenced by diet¹⁹, and increased sympathetic tone can also be influenced by diet¹⁹, and increased sympathetic tone has been linked to the development of LUTS. A study by McVary et al. showed that sympathetic tone directly correlated with increasing American Urological Association Symptoms scores⁴. A similar link between catecholamines and life stress as it relates to urinary symptoms has been described¹. Finally, androgens, which are necessary for prostate growth and likely play a role in BPH development through influences of prostatic growth factors²⁰, are another possible dietary mechanism for LUTS development. A decrease in the bioavailability of testosterone relative to estrogen levels has been shown to influence prostate growth⁵.

The finding of an inverse correlation between both alcohol intake and exercise and LUTS have been reported previously in similar study populations⁸. Only alcohol intake was significant on multivariate analysis, but both exercise and alcohol intake were highly correlated with a healthy diet⁹. Overall, these findings support a theory that a lifestyle that includes a healthy diet, exercise, and moderate alcohol intake, may decrease the risk of LUTS. Further study of how these three variables work together in the individual to decrease LUTS is certainly warranted.

The relationship between race and LUTS was an intriguing finding from the study that has been suggested before²¹. Confounding variables that were not included in this analysis but have been shown to effect LUTS, including socioeconomic status and education, may explain some of the differences we found between races²². A further consideration, however might be that the differences in LUTS reported between levels of socioeconomic status and education may be in part influenced by known differences in diet, although this theory requires further investigation.

Our analysis has several limitations that warrant brief mention. Our data are cross-sectional in nature, and although they can demonstrate association between diet and LUTS, they cannot show conclusively a causal relationship between diet and LUTS. Our definition of LUTS was based on only 2 self-reported questions that have not been validated to describe all LUTS/BPH patients. Having a more precise questionnaire, such as IPSS, would certainly allow a better understanding of the relationship between diet and LUTS. In addition, with such few men reporting 2 symptoms (n=30), we were unable to demonstrate a dose dependent relationship between LUTS and diet that should exist if diet is truly causal.

Despite these limitations, our analysis is noteworthy for its methodological rigor and use of contemporary and highly generalizable US data. Our finding of a nearly 70% reduction of odds of LUTS among patients with the healthiest diet needs further confirmation, but suggest that diet alteration may be a potential option in the management of this common and bothersome symptom.

Conclusion

This study demonstrated an association between consuming less healthy diet and LUTS after controlling for other modifiable risk factors. However, further investigation into the mechanism of dietary LUTS prevention is warranted.

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