Original Article

Vitamin D deficiency and lower urinary tract symptoms in males above 50 years of age

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Abstract

Context: Lower urinary tract symptoms (LUTSs) in elderly males are usually related to benign prostatic hyperplasia (BPH) in the majority of cases. It is estimated that BPH affects half of men above the age of 50 years. Recently, a relationship between Vitamin D deficiency and LUTS in elderly males has been reported.

Aims: The aim of this study was to analyze Vitamin D levels in males aged above 50 years presenting with LUTS.

Settings and Design: This is a prospective case–control study.

Patients and Methods: This was a case–control study in which males above 50 years of age who presented with LUTS (Group A) were compared with a control group (Group B) without LUTS. Both groups were investigated regarding Vitamin D level, prostate-specific antigen (PSA), International Prostatic Symptoms Score (IPSS), prostate size, flow rate, serum calcium levels, and abdominal ultrasonography.

Statistical Analysis Used: Statistical software package (SPSS Inc., Chicago, IL, USA) was used for the statistical analyses, performing *t*-test for quantitative data to compare between the two groups. Pearson's correlation coefficient "*r*" test was calculated between two quantitative, continuous variables in Group A. $P < 0.05$ was considered statistically significant.

Results: A total of 150 patients were studied. There were 70 and 80 patients in Groups A and B, respectively. The mean age of Group A patients was 60.32 ± 11.93 years versus 58.12 ± 10.55 years for Group B patients ($P > 0.05$). The mean value of Vitamin D level was 40.82 ± 29.46 nmol/L in Group A and 70.25 ± 22.42 nmol/L in Group B ($P < 0.001$). The mean value of prostate size was 50.12 ± 23.24 g in Group A and 30.68 ± 4.90 g in Group B ($P < 0.001$). The mean serum calcium level was 2.4 ± 0.14 mmol/L

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Received: 27.05.2016, **Accepted:** 14.10.2016

Access this article online

Quick Response Code:

Website: www.urologyannals.com

DOI: 10.4103/0974-7796.204192

How to cite this article: Elshazly MA, Sultan MF, Aboutaleb HA, Salem SM, Aziz MS, Abd Elbaky TM, *et al*. Vitamin D deficiency and lower urinary tract symptoms in males above 50 years of age. Urol Ann 2017;9:170-3.

and 2.50 ± 0.15 mmol/L in Groups A and B, respectively ($P < 0.001$). The mean value of PSA in Group A was 2.24 ± 1.95 ng/ml versus 2.11 ± 0.45 ng/ml in Group B ($P < 0.001$). The mean value of IPSS in Group A was 13.38 ± 5.32 ml/s versus 3.41 ± 2.42 ml/s in Group B. The mean value of Q max in uroflowmetry in Group A was 11.5 ± 2 ml/s versus 15.4 ± 1 ml/s in Group B.

Conclusions: Men older than 50 years of age with LUTS have lower levels of Vitamin D compared to men without LUTS.

Key Words: Benign prostatic hyperplasia, lower urinary tract symptoms, Vitamin D

INTRODUCTION

Lower urinary tract symptoms (LUTSs) are a group of symptoms related to storage and voiding functions of the urinary bladder. It can be due to various abnormal structural and neurological causes affecting the urinary bladder or the prostate. LUTSs in elderly males have been linked mainly to benign prostatic hyperplasia (BPH).[1,2] Vitamin D3 (calcitriol) or (1,25-dihydroxycholecalciferol) deficiency has been studied recently in various health problems as it has an impact on metabolic functions of different organs and systems in the human body.[3,4] Recent studies on the pharmacology of lower urinary tract showed that Vitamin D receptor may have a potential role in the future treatment of LUTS.[5-7] Results from the National Health and Nutrition Examination Survey showed in a multivariate analysis that Vitamin D deficiency is associated with LUTS among the US men.[2] Intake of Vitamin D supplement and Vitamin D analog has been shown to be associated with a decrease in BPH prevalence and a decrease in prostatic size.[7-9]

The current study aims to find the relationship between serum levels of Vitamin D and LUTS in the Middle East elderly males above 50 years of age.

PATIENTS AND METHODS

This was a case–control study in which males above 50 years of age who presented to our urology outpatient clinic complaining of LUTS (Group A) were compared with a control group (Group B) complaining of other symptoms as infertility or loin pain without LUTS. Both groups were investigated regarding Vitamin D level, prostate-specific antigen (PSA), International Prostatic Symptoms Score (IPSS), prostate size, flow rate, serum calcium levels, and abdominal ultrasonography. Patients with LUTS were evaluated through IPSS symptoms score and flow rate. The exclusion criteria were males younger than 50 years, men on medications that may affect their flow rates, and men with urinary tract neoplasia, known Vitamin D deficiencies, or debilitating diseases or neurological diseases such as Parkinson's disease or diabetes mellitus.

Vitamin D level was measured in the fasting state using radioimmunoassay. Normal Vitamin D level was considered if ≥50 nmol/L. Vitamin D deficiency was considered if the Vitamin D level was <50 nmol/L. Normal calcium level was considered as 2.2–2.6 mmol/L.[8] Cases of Vitamin D deficiency were treated with 50,000 IU orally per week for 8 weeks. Normal PSA level was considered as <4 ng/ml. Medical treatment of LUTS in the form of alpha blockers with or without 5 alpha-reductase inhibitors was prescribed to all Group A patients. The study was approved by the local Ethical Committee.

Statistical analysis

Statistical software package (SPSS Inc., Chicago, IL, USA) was used for the statistical analyses, performing *t*-test for quantitative data to compare between the two groups. Pearson's correlation coefficient "*r*" test was calculated between two quantitative, continuous variables in Group A. $P < 0.05$ was considered statistically significant.

RESULTS

A total of 150 patients were studied. There were 70 and 80 patients in Groups A and B, respectively. The mean age of Group A patients was 60.3 ± 11.9 years versus 58.1 ± 10.55 years in Group B patients ($P > 0.05$).

All patients were above 50 years old. The mean value of Vitamin D level was significantly lower in LUTS group (41 nmol/L in Group A vs. 70 nmol/L in Group B) ($P < 0.001$). However, the correlation between IPSS and Vitamin D using Pearson's correlation was statistically insignificant ($r = 0.07$) (correlation is significant at 0.01 level) (two-tailed) [Figure 1 and Table 1]. Prostatic size was 50 g in Group A and 32 g in Group B ($P < 0.001$). Calcium level was 2.4 mmol/L and 2.5 mmol/L in Groups A and B, respectively ($P < 0.001$). The mean value of PSA in Group A was 2.2 ng/ml versus 2.11 ng/ml in Group B ($P > 0.05$). The mean value of maximum flow at flow rate in Group A was 11.5 ± 2 ml/s versus 15.5 ± 1 ml/s in Group B. The mean value of IPSS in Group A was 13.4 ± 5.3 ml/s versus 3.4 ± 2.4 ml/s in Group B [Table 2].

DISCUSSION

Bladder outlet obstruction mainly due to BPH causes a variety of LUTSs. LUTSs constitute a group of symptoms including nocturia, frequency of micturition, straining to void, incomplete bladder emptying, urgency, and hesitancy. Recently, LUTS has become the preferred term for describing or studying male urinary symptoms because it gives epidemiological description not related to specific disease or organs.[10-12] This is considered a significant health problem that bothers the quality of life of elderly men as the prevalence of LUTS increases with age reaching up to 70% of men above 60 years of age.[13]

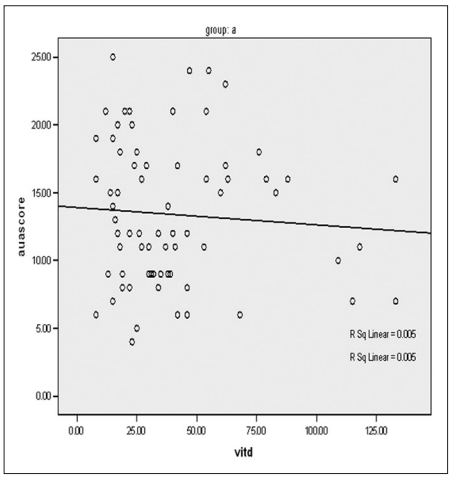

Figure 1: Correlation between Vitamin D and International Prostatic Symptoms Score in Group A

Table 1: Correlation coefficient between Vitamin D and prostate size, prostate-specific antigen, calcium, and International Prostatic Symptoms Score in Group A patients

Variable	Serum Vitamin D (*r*)	*P*
Prostate size (g)	0.09	>0.05
PSA (ng/ml)	0.18	>0.05
Calcium	0.14	>0.05
IPSS	0.07	>0.05

PSA: Prostate-specific antigen, IPSS: International Prostatic Symptoms Score

Table 2: Comparison between groups regarding age, Vitamin D, prostate size, prostate-specific antigen, calcium, International Prostatic Symptoms Score, and maximum flow

Variable	Mean±SD		*P*
	Group A (*n*=70)	Group B (*n*=80)	
Age (years)	60.32±11.93	58.12±10.55	>0.05
Vitamin D**	40.82±29.46	70.25±22.42	<0.001
Prostate size (g)	50.12±23.24	30.68±4.90	<0.001
PSA (ng/ml)	2.24±1.95	2.11±0.45	>0.05
Calcium**	2.41±0.14	2.50±0.15	<0.001
IPSS	13.4±5.3	3.4±2.4	<0.001
Q_{max} (ml/s)	11.5±2	15.5±1	<0.001

***P*-values <0.05 is significant, <0.001 highly significant
Data shown are for mean±SD. PSA: Prostate-specific antigen, IPSS: International Prostatic Symptoms Score, SD: Standard deviation

Vitamin D receptors are detected in bladder and prostate.[5,6] Prostate has a role in endocrine and autocrine Vitamin D metabolism pathways, as it is able to hydroxylate 25, hydroxyvitamin D into the active Vitamin D form (1,25-dihydroxyvitamin D). Many epidemiological studies have reported the link between prostate cancer and Vitamin D deficiency; however, studies reporting link between Vitamin D deficiency and LUTS are lacking in literature.[14-17]

Experimental studies on the effect of Vitamin D receptor agonist, BXL628 (elocalcitol), on BPH showed promising results. Consequent clinical studies on Vitamin D analog proved that it prevents the proliferation of bladder and prostatic smooth muscle cells in BPH, which is thought to be through inhibition of the RhoA/Rho kinase pathway.[18-20]

Data from an American survey in 2005–2006 showed that low-level Vitamin D was highly prevalent among adult men in the US, and Vitamin D deficiency was associated with moderate-severe urinary incontinence and the presence of at least one LUTS.[2] Other studies from different geographic areas addressing relation between LUTS and Vitamin D deficiencies are lacking in the literature. This study included seventy cases with LUTS compared to eighty cases of age-matched group population as a control group and showed significantly lower Vitamin D level in the LUTS group. There was a correlation between Vitamin D deficiency and prostatic size, PSA level, IPSS, and calcium level, however this correlation is not statistically significant ($P > 0.05$).

The limitation of our study is the lack of observation of the sole effect of Vitamin D replacement on patients with LUTS and low Vitamin D as this was not approved by the local Ethical Committee. Larger controlled studies with assessment of the effect of Vitamin D replacement on elderly men with LUTS may be needed to draw a firm conclusion. Further studies addressing the impact of Vitamin D replacement or supplementation on improving LUTS may affect practice in the future.

CONCLUSION

Our data showed that males older than 50 years of age with LUTS have lower levels of Vitamin D compared to men without LUTS.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

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