Int Urogynecol J (2009) 20:1339–1344
DOI 10.1007/s00192-009-0949-z

ORIGINAL ARTICLE

Prevalence and risk factors for bothersome lower urinary tract symptoms in women with diabetes mellitus from hospital-based diabetes clinic

Abdalla M. Fayyad · Simon R. Hill · Geraint Jones

Received: 28 March 2009 / Accepted: 11 June 2009 / Published online: 15 July 2009
© The International Urogynecological Association 2009

Abstract
Introduction and hypothesis There is limited data on prevalence and risk factors for bothersome lower urinary tract symptoms (LUTS) in women with diabetes mellitus (DM). This study assesses prevalence and risk factors for bothersome LUTS and voiding dysfunction in women with DM.
Methods Two hundred twenty women participated in this study. Participants completed the King's health questionnaire and the international consultation on incontinence-female lower urinary tract symptom questionnaire. Symptoms prevalence and urinary flow rate were assessed. Logistic regression models for risk factors of bothersome LUTS and voiding dysfunction were constructed.
Results One hundred forty-eight women completed the study. Sixty-one women (41%) had bothersome LUTS. Urgency incontinence, urgency, and nocturia were the most bothersome. Fifty-six (38%) had voiding dysfunction. Neuropathy and glycosylated haemoglobin were independent risk factors for voiding dysfunction. Voiding dysfunction did not affect quality of life in women with DM.
Conclusions Overactive bladder symptoms are the most bothersome in diabetic women. Neuropathy and glycosylated haemoglobin are risk factors for voiding dysfunction.

Keywords Bother · Diabetes mellitus · Lower urinary tract symptoms · Quality of life · Voiding dysfunction

A. M. Fayyad (✉)
Warrell Unit, St Mary's Hospital,
Whitworth Park,
Manchester M13 0JH, UK
e-mail: amfayyad@hotmail.com

S. R. Hill
Obstetrics and Gynaecology, East Lancashire NHS trust,
Haslingden Road,
Blackburn BB2 3HH, UK

G. Jones
Diabetes Unit, East Lancashire NHS trust,
Haslingden Road,
Blackburn BB2 3HH, UK

Introduction

Diabetes mellitus (DM) has reached epidemic proportions worldwide [1, 2]. Complications of DM are the most important disease-specific determinant of quality of life [3]. Disease-specific measures to assess the impact of these complications on quality of life are important in order to guide and evaluate treatment interventions.

Urinary incontinence has been associated with significant impact on quality of life [4, 5], functional decline, and death in the general population [6]. Urinary incontinence may even have a higher impact on quality of life in older women with DM because of the accompanying neurological deficits such as impaired sensation and visual field defects [7]. Studies evaluating the impact of lower urinary tract symptoms (LUTS) on quality of life in women with DM are scarce [8, 9]. Previous studies focused on the prevalence of urinary incontinence [1, 8], while other symptoms such as urgency, daytime frequency, and nocturia are rarely reported and quantified [9]. Furthermore, the studies were either retrospective, included patients with DM that were already referred with symptoms [10], or used non-validated screening methods for assessment of urinary incontinence [1]. As a result, prevalence and risk factors for bothersome LUTS in DM and their impact on quality of life are poorly reported in the literature.

The primary aim of this study is to assess risk factors for LUTS and voiding dysfunction in women with DM. The secondary aim is to establish symptom prevalence in the bothersome group.

Materials and methods

Ethics committee approval was obtained for this study, and patient consent was obtained prior to participation. Women were recruited consecutively from a consultant-led diabetes clinic in a large general hospital in the UK. LUTS were assessed using the King's health questionnaire (KHQ) [4] and the international consultation on incontinence-female lower urinary tract symptom questionnaire (ICIQ-FLUTS) [11]. The ICIQ-FLUTS is a validated quality of life questionnaire that has 12 questions divided into three domains: filling domain, scored as the sum of questions 2a–5a; voiding domain, scored as the sum of questions 6a–7a; and incontinence domain, scored as the sum of questions 9a–13a. In both questionnaires, higher scores correlate with symptoms' severity and impact on quality of life. Bother scales are not incorporated into the overall score but indicate the impact of individual symptoms for each patient.

The primary aim of this study is to assess risk factors for bothersome LUTS in DM, and with an anticipated prevalence of 40%, at least 50 women would be needed in each arm (bothersome vs non-bothersome) to have 80% power to detect differences between the two groups at 0.05 significance. With an anticipated dropout rate of 20%, and further 20% exclusion due to incomplete questionnaire/data filling, we aimed to recruit at least 200 women into the study.

Patients' age, body mass index (BMI), parity, smoking status, duration of DM, glycosylated haemoglobin level (within the last 4 weeks), and presence of peripheral diabetic neuropathy were assessed. Peripheral neuropathy was defined as a combination of symptoms (sensory or motor) and signs including abnormalities of primary sensory modalities (pain, touch, hot, cold, vibration, and proprioception), motor system (weakness and atrophy), tendon reflexes (depressed or unelicitable), or autonomic system [12]. This definition has been shown to be useful in field and epidemiologic studies of diabetic polyneuropathy [12, 13].

Urinary flow rate and post-void residuals were measured using spontaneous uroflowmetry (Dantec Urodyn Flowmeter 1000, 22G02) and ultrasonic residual urine measurement (Bladder scanner BVI 3000). Voided volumes and maximum flow rate were recorded and converted into centiles and plotted on the Liverpool nomograms [14]. Maximum flow rate centile less than tenth centile and post-void residual >50 ml were considered abnormal [15].

All patients underwent pelvic examination including assessment of pelvic organ prolapse using the pelvic organ prolapse quantification system [16], and women with stage 2 prolapse or more were excluded from the study. A mid-stream sample of urine was analysed to exclude urinary tract infection (UTI), and those with suspected UTI were not included in the study. Patients with previous surgery for urinary incontinence or pelvic organ prolapse were excluded from the study. None of the patients suffered from cerebrovascular disease or dementia.

Statistical analysis

The cohort was divided into two groups, according to their responses to the ICIQ-FLUTS bother scale, into women suffering from bothersome LUTS and those with non-bothersome LUTS. Bothersome LUTS was assigned when the patients' perceived degree of bother in the ICIQ-FLUTS was 6 or more. Recorded variables between the two groups were compared using two-sample independent *t* test for continuous variables and two-way chi-square test for categorical variables. These variables were used in a logistic regression model to assess risk factors for bothersome LUTS in DM.

Women were then divided into those with and without voiding dysfunction (see above for definition of voiding dysfunction). Recorded variables between the two groups were compared as above, and a logistic regression model was constructed to assess risk factors for voiding dysfunction.

For logistic regression analysis, categorical variables were assigned as follows: type 1 DM as 0 and type 2 DM as 1; absence of peripheral neuropathy as 0 and presence of neuropathy as 1; and not using insulin as 0 and insulin use as 1. The Hosmer–Lemeshow chi-square test was used to test the logistic regression model fit. Statistics were performed with Statistical Package for the Social Sciences (SPSS) for Windows (version 15.0; SPSS Inc, Chicago, IL, USA).

Results

Two hundred twenty consecutive women were recruited, 182 attended for follow-up, and 32 were excluded due to incomplete questionnaires or suspected UTI. Two were excluded due to previous colposuspension. None of the women had stage 2 or more pelvic organ prolapse or history of vaginal prolapse repair. One hundred forty-eight women completed the study, 60 women had type 1, and 88 had type 2 DM. Sixty-one women (41%) had bothersome LUTS. Women with bothersome LUTS were more likely to have type 2 DM. There were no differences in age, parity, BMI, insulin use, smoking, neuropathy, duration of DM, and

glycosylated haemoglobin level between the two groups (Table 1). Logistic regression analysis showed that DM type is not a significant risk factor for bothersome LUTS at a 95% level.

Figure 1 shows the differences in the KHQ scores between bothersome and non-bothersome groups. All domains of the KHQ (except general health) were significantly higher in the bothersome group confirming the validity of categorising women into bothersome and non-bothersome groups using the bother scale of the ICIQ-FLUTS. Table 2 shows the ICIQ-FLUTS and objective voiding parameters between the two groups. Urinary filling (storage) and incontinence scores were significantly higher in the bothersome group. Voiding score, peak flow rate centiles, and residuals were not different between the two groups.

The three most bothersome symptoms in women with DM were, in descending order, urgency incontinence (mean bother 9), urgency (mean bother 8.2), and nocturia (mean bother 8.0). The prevalence of these symptoms was urgency (57 women, prevalence 38.5%), nocturia (48 women, prevalence 32.4%), followed by urgency incontinence (42 women, prevalence 28.3%).

Fifty-six (37.8%) women had evidence of voiding dysfunction. Patients with voiding dysfunction were more likely to have type 1 DM, longer duration of DM, peripheral neuropathy, and higher HbA1c compared to women with normal voiding (Table 3). Logistic regression analysis showed that the following variables were significant risk factors for voiding dysfunction at a 95% level: peripheral diabetic neuropathy (p=0.031, odds ratio 6.16, confidence interval (CI) 1.17–32.28) and glycosylated haemoglobin level (p=0.03, odds ratio 1.73, CI 1.05–2.86; Table 4).

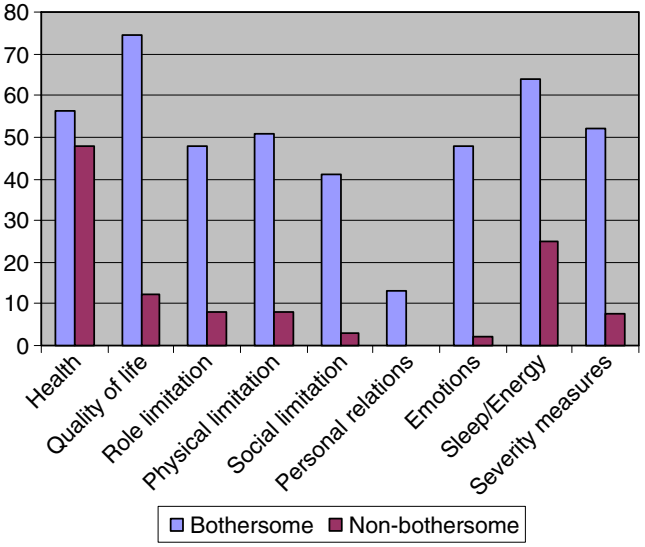

Fig. 1 Comparison of King's health questionnaire domains in women with bothersome and non-bothersome lower urinary tract symptoms

Figure 2 shows the KHQ scores in women with voiding dysfunction compared to women with normal voiding. Women with abnormal voiding had significantly lower scores in the following domains of the KHQ: impact on quality of life, physical limitations, social limitations, emotions, and severity measures.

Table 1 Comparison of demographics and diabetes mellitus characteristics between women with bothersome and non-bothersome lower urinary tract symptoms

	Bothersome LUTS (n=61) mean (SD)	Non-bothersome LUTS (n=87) mean (SD)	p value
Age	56.4 (12.3)	52.4 (13.1)	0.12[a]
Parity	2.5 (2.4)	1.7 (1.8)	0.19[a]
Duration of DM	12.1 (9.6)	16.2 (9.7)	0.12[a]
BMI	27.4 (5.3)	25.6 (4.1)	0.34[a]
HbA1c	8.99 (1.99)	9.38 (2.6)	0.54[a]
Smoking	36	42	0.40[b]
Diabetes type (1 vs 2)	20 vs 58	40 vs 30	0.01[b]
Insulin use	38	58	0.06[b]
Neuropathy	26	30	0.89[b]

SD standard deviation

[a] Independent sample t test

[b] Chi-square test

Discussion

The pathophysiology of DM-associated bladder complications is probably variable and certainly unclear. Initial studies on the effect of DM on the bladder attributed abnormal bladder function to autonomic neuropathy leading to impaired sensation, reduced urinary flow rates, and high residual volumes [17]. For some time, impaired voiding in DM has been described as the primary culprit in LUTS without much scientific evidence. This concept has been recently challenged as abnormal bladder function in DM can be attributable to changes in the detrusor muscle, urothelium, and innervation, along with changes in central neurological control [18].

Our study showed that 63% of women with DM have one or more LUTS with bother scale of 6 or more in the ICIQ-FLUTS. We could not demonstrate association between bothersome LUTS and patients' demographics or disease-specific risk factors for end organ damage. Hence, screening for bothersome LUTS in this group should be universal and incorporated into their routine care, particularly in secondary and tertiary care. The International

Table 2 Comparison of incontinence-female lower urinary tract symptom questionnaire scores and voiding parameters between diabetic women with bothersome and non-bothersome lower urinary tract symptoms

Domain	Bothersome LUTS (mean/SD; n=61)	Non-bothersome LUTS (mean/SD; n=87)	p value[a]
Filling (storage) score	6.73 (3.2)	3.77 (2.22)	0.001
Voiding score	2.06 (2.26)	1.55 (1.89)	0.35
Incontinence score	9.45 (5.19)	3.00 (3.45)	<0.001
Peak flow rate centile	38.9 (30.3)	31.7 (28.5)	0.44
Residual	33.2 (43.6)	59.9 (75.6)	0.11

[a] Independent sample t test

Continence Society recommends standardised questionnaires or interviews to accurately describe LUTS in patients with medical problems [19]. Furthermore, the concept of assessing the degree of bother in lower urinary tract dysfunction is relatively new [20, 21]. In this study, we used the bother scale of the ICIQ-FLUTS questionnaire. To our knowledge, this has not been reported before.

The most bothersome LUTS in DM were storage (overactive bladder (OAB)) symptoms. Previous reports from the EPIC study estimated the overall prevalence of OAB in Europe and Canada to be 12.8% among women. There was an association between medical co morbidities including DM and increased prevalence of OAB [22]. Our study shows much higher prevalence of OAB symptoms in women with DM. This can be due to recruiting women from a hospital-based diabetes clinic that tends to manage cases with more advanced or complicated DM.

Diabetic patients and their health care team often attribute OAB symptoms (particularly nocturia) to increased urine production in DM. We recently showed that the cause of bothersome LUTS in DM is multifactorial and related to factors in the urothelium, detrusor muscle, and bladder innervation and cannot be attributed to increased urine production alone [18].

The Nurses' Health Study reported the prevalence of urinary incontinence in women with DM at 17.4%. Women with type 2 DM were at modestly but significantly greater risk of incontinence [1]. Quality of life assessment and degree of bother was not assessed, and information on the type of incontinence (stress vs urge) and its risk factors was not available. Recent evidence suggests that impaired fasting glucose increases the risk of urinary incontinence in women compared to age-matched controls [8]. Although previous studies showed a significant correlation between urinary incontinence and duration of DM, use of insulin, and peripheral neuropathy [1, 8], we could not demonstrate a correlation between bothersome LUTS and the above variables. Patient-reported duration of DM, however, is not an accurate estimate of the true length of the disease, hence, true duration of DM is difficult to accurately assess in epidemiological studies. The above studies evaluated urinary incontinence as the primary outcome, whilst the primary outcome of our study focused on bothersome LUTS. This difference in outcome measures could partly explain the discrepancy between our study and previous literature.

In this study, we have shown that 38% of diabetic females have evidence of voiding dysfunction. This does

Table 3 Comparison of demographics and diabetes mellitus characteristics between women with normal and abnormal voiding

	Normal voiding mean (SD; n=46)	Abnormal voiding mean (SD; n=28)	p value
Age	55.0 (13.1)	54.1 (12.2)	0.81[a]
Parity	2.2 (2.4)	1.8 (1.5)	0.58[a]
Duration of DM	11.3 (7.4)	18.1 (11.9)	0.01[a]
BMI	29	31	0.72[a]
HbA1c	8.5 (2.0)	10.2 (2.2)	0.007[a]
Smoking	44	34	0.33[b]
Diabetes type (I vs II)	28 vs 64	32 vs 24	0.01[b]
Insulin use	38	44	0.58[b]
Neuropathy	10	44	0.01[b]

[a] Independent sample t test

[b] Chi-square test

Table 4 Logistic regression analysis for risks of voiding dysfunction and bothersome lower urinary tract symptoms

	Voiding dysfunction			Bothersome LUTS		
	P value	OR	95% CI	*P* value	OR	95% CI
Type	0.38	0.31	0.02–4.24	0.57	0.53	0.062–4.63
Neuropathy	0.031	6.16	1.17–32.28	0.79	0.84	0.23–3.03
Age	0.12	1.07	0.98–1.16	0.61	0.98	0.92–1.05
Duration	0.95	1.003	0.90–1.11	0.48	1.03	0.94–1.13
HbA1c	0.031	1.73	1.05–2.86	0.43	0.86	0.59–1.24
Insulin	0.69	1.79	0.093–34.6	0.43	2.44	0.27–22.2

not seem to have an impact on quality of life, as domains of the KHQ in these women showed similar or less impact on quality of life compared to women with normal voiding. This supports the findings of the study by Yu et al. [23], which showed that although 22.2% of females with type 2 DM have voiding dysfunction compared to age-matched controls, the majority of these women were asymptomatic. Severe voiding difficulty, however, can have significant health risks including an increased risk of lower UTI and upper urinary tract damage [24]. A recent case control study of the effects of DM on female voiding behaviour showed that women with DM have weaker urinary streams, less voided volumes, lower maximal flow rate, and higher post-void residuals compared to controls [9]. Peripheral neuropathy was an independent risk factor associated with voiding dysfunction. Our study supports and extends these findings. Peripheral neuropathy can be associated with alteration of nerve supply to the bladder resulting in decrease in bladder emptying efficiency. Furthermore, these findings suggest that diabetic women with neuropathy should be offered screening for voiding dysfunction. A study assessing the value of this intervention is needed.

Earlier studies on the involvement of the lower urinary tract in diabetic patients partly attributed the symptoms of

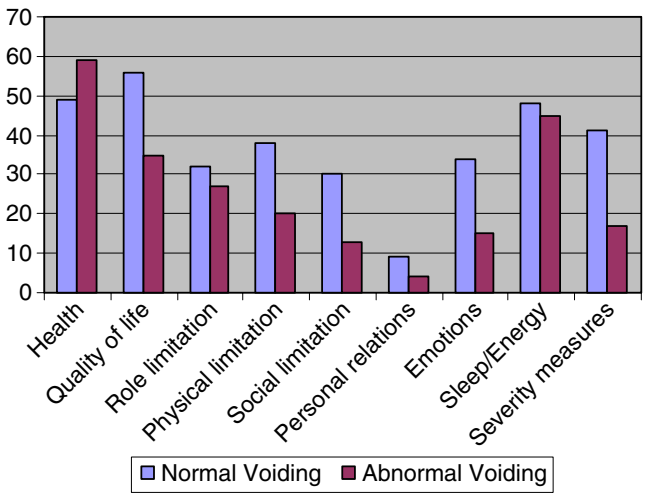

Fig. 2 Comparison of King's health questionnaire domains between women with normal and abnormal voiding

frequent voiding and nocturia to impaired bladder emptying with high post micturition residual. Starer and Libow [25] challenged this concept in an analysis of pressure-flow studies during voiding in diabetic nursing home patients. The authors concluded that the aetiology of LUTS in elderly diabetic patients cannot be assumed to be solely due to poorly contracting bladders.

To our knowledge, our study is the first to assess voiding function in diabetic patients using the Liverpool nomogram and peak flow rate centiles [14]. This has been shown to be more accurate in assessing voiding function compared to using a cut-off point for peak flow rate regardless of the voided volume [26]. Furthermore, using peak flow rate centile enabled us to include all women in the study. Using a cut-off point for voided volume, below which measurements are discarded, can potentially miss out a significant proportion of the study population that will void less than the cut-off point due to various reasons, one of which is low bladder capacity. This can produce significant selection bias [26].

The strengths of the present study were the reasonably large sample size, the well-characterised patients, and the high response rate. This may indicate the importance of these symptoms to women with DM. Patients were recruited from a DM unit and did not present with LUTS, which gives an accurate prevalence of symptoms in this setting. In addition, well-constructed and validated questionnaires were used to assess prevalence of urinary symptoms without restriction to urinary incontinence. An important strength was that medical records were completed by a diabetes consultant (GJ). This meant that the clinical information on the individual patient was available, as compared to limitations in epidemiological studies.

There are a number of limitations to this study. Only women were recruited into this study, and further research to assess the effect of DM on lower urinary tract function in men is needed. Furthermore, there is lack of urodynamics data on these women, partly due to ethical reason as these women were recruited from a diabetes unit and were not referred for urodynamic assessment. Other potential bias includes recruiting subjects from secondary/tertiary care diabetes clinic. These women tend to suffer from advanced DM with potentially higher prevalence of LUTS and

voiding dysfunction. A longitudinal study to assess the relation between DM and the chronology of development of LUTS is needed. Finally, HbA1c is a measure of long-term control of DM. Our study did not assess the short-term control of DM as a risk factor for bothersome LUTS. Further research in this area is needed.

In conclusion, bothersome LUTS are highly prevalent in women with DM. No demographic or disease-specific variable has been identified as risk factor for bothersome LUTS. Storage symptoms such as urgency, urgency incontinence, and nocturia were the most bothersome. Voiding dysfunction affects a significant proportion of women with DM, without a significant impact on quality of life. Peripheral neuropathy and elevated HbA1c are independent risk factors for voiding dysfunction in women with DM.

Acknowledgment We would like to thank Fateema Utarkar for the secretarial support throughout the study.

Details of ethical approval The study was approved by Lancashire and Cumbria Local Research Ethics Committee, Reference Number 06/Q1309/104. Approval was granted on 2/11/2006.

Funding None.

Conflicts of interest A. Fayyad received travel sponsorship from Pfizer, UCB Pharma Ethicon Gynaecare, and Astellas and speaker money from Pfizer and UCB Pharma. S. Hill received travel sponsorship from Pfizer and Astellas, speaker money from Pfizer and Astellas, and was awarded research grants by Pfizer. G. Jones declared no conflict of interest.

References

1. Lifford KL, Curhan GC, Hu FB, Barbieri RL, Grodstein F (2005) Type 2 diabetes mellitus and risk of developing urinary incontinence. J Am Geriatr Soc 53:1851–1857
2. Boyle JP, Honeycutt AA, Narayan KM, Hoerger TJ, Geiss LS, Chen H et al (2001) Projection of diabetes burden through 2050: impact of changing demography and disease prevalence in the U. S. Diabetes Care 24:1936–1940
3. Rubin RR, Peyrot M (1999) Quality of life and diabetes. Diabetes Metab Res Rev 15:205–218
4. Kelleher CJ, Cardozo LD, Khullar V, Salvatore S (1997) A new questionnaire to assess the quality of life of urinary incontinent women. Br J Obstet Gynaecol 104:1374–1379
5. Basra R, Kelleher C (2007) Disease burden of overactive bladder: quality-of-life data assessed using ICI-recommended instruments. Pharmacoeconomics 25:129–142
6. Holroyd-Leduc JM, Mehta KM, Covinsky KE (2004) Urinary incontinence and its association with death, nursing home admission, and functional decline. J Am Geriatr Soc 52:712–718
7. Hunter KF, Moore KN (2003) Diabetes-associated bladder dysfunction in the older adult. Geriatr Nurs 24:138–145
8. Brown JS, Vittinghoff E, Lin F, Nyberg LM, Kusek JW, Kanaya AM (2006) Prevalence and risk factors for urinary incontinence in women with type 2 diabetes and impaired fasting glucose: findings from the National Health and Nutrition Examination Survey (NHANES) 2001–2002. Diabetes Care 29:1307–1312
9. Lee WC, Wu CC, Wu HP, Tai TY (2007) Lower urinary tract symptoms and uroflowmetry in women with type 2 diabetes mellitus with and without bladder dysfunction. Urology 69:685–690
10. Kaplan SA, Te AE, Blaivas JG (1995) Urodynamic findings in patients with diabetic cystopathy. J Urol 153:342–344
11. Abrams P, Avery K, Gardener N, Donovan J (2006) The international consultation on incontinence modular questionnaire: www.iciq.net. J Urol 175:1063–1066
12. Devigili G, Tugnoli V, Penza P, Camozzi F, Lombardi R, Melli G et al (2008) The diagnostic criteria for small fibre neuropathy: from symptoms to neuropathology. Brain 131:1912–1925
13. England JD, Gronseth GS, Franklin G, Miller RG, Asbury AK, Carter GT et al (2005) Distal symmetric polyneuropathy: a definition for clinical research: report of the American Academy of Neurology, the American Association of Electrodiagnostic Medicine, and the American Academy of Physical Medicine and Rehabilitation. Neurology 64:199–207
14. Haylen BT, Ashby D, Sutherst JR, Frazer MI, West CR (1989) Maximum and average urine flow rates in normal male and female populations—the Liverpool nomograms. Br J Urol 64:30–38
15. Costantini E, Mearini E, Pajoncini C, Biscotto S, Bini V, Porena M (2003) Uroflowmetry in female voiding disturbances. Neurourol Urodyn 22:569–573
16. Bump RC, Mattiasson A, Bo K, Brubaker LP, DeLancey JO, Klarskov P et al (1996) The standardization of terminology of female pelvic organ prolapse and pelvic floor dysfunction. Am J Obstet Gynecol 175:10–17
17. Frimodt-Moller C (1978) Diabetic cystopathy. A review of the urodynamic and clinical features of neurogenic bladder dysfunction in diabetes mellitus. Dan Med Bull 25:49–60
18. Hill SR, Fayyad AM, Jones GR (2008) Diabetes mellitus and female lower urinary tract symptoms: a review. Neurourol Urodyn 27:362–367
19. Abrams P, Cardozo L, Fall M, Griffiths D, Rosier P, Ulmsten U et al (2002) The standardisation of terminology of lower urinary tract function: report from the Standardisation Sub-committee of the International Continence Society. Neurourol Urodyn 21:167–178
20. Marschall-Kehrel D, Roberts RG, Brubaker L (2006) Patient-reported outcomes in overactive bladder: the influence of perception of condition and expectation for treatment benefit. Urology 68:29–37
21. Payne CK, Kelleher C (2007) Redefining response in overactive bladder syndrome. BJU Int 99:101–106
22. Coyne KS, Sexton CS, Irwin D, Kopp Z, Kelleher C, Milsom I (2008) The impact of overactive bladder, icontinence and other lower urinary tract symptoms on quality of life, work productivity, sexuality and emotional well-being in men and women: results from the EPIC study. BJU Int 101:1388–1395
23. Yu HJ, Lee WC, Liu SP, Tai TY, Wu HP, Chen J (2004) Unrecognized voiding difficulty in female type 2 diabetic patients in the diabetes clinic: a prospective case-control study. Diabetes Care 27:988–989
24. Geerlings SE, Stolk RP, Camps MJ, Netten PM, Hoekstra JB, Bouter KP et al (2000) Asymptomatic bacteriuria may be considered a complication in women with diabetes. Diabetes mellitus women asymptomatic bacteriuria utrecht study group. Diabetes Care 23:744–749
25. Starer P, Libow L (1990) Cystometric evaluation of bladder dysfunction in elderly diabetic patients. Arch Intern Med 150:810–813
26. Haylen BT, Yang V, Logan V (2008) Uroflowmetry: its current clinical utility for women. Int Urogynecol J Pelvic Floor Dysfunct 19:899–903