

Relationship between urinary incontinence symptoms and urodynamic findings using a validated Arabic questionnaire

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BACKGROUND: Urinary incontinence is common, particularly in women. Urodynamic studies (UDS) can accurately assess the condition. Less invasive objective measuring tools correlate with urodynamic findings, but the Arabic version of the Urogenital Distress Inventory-6 (UDI-6) questionnaire has not been previously correlated with UDS in Arabian patients.

OBJECTIVE: To correlate the Arabic version of the UDI-6 with urodynamic findings in Arabian women with urinary incontinence.

DESIGN: Prospective.

SETTING: Tertiary referral urology clinic.

PATIENTS AND METHODS: All female patients presenting with urinary incontinence between July 2013 to March 2014. Patients answered the Arabic UDI-6 questionnaire and underwent a history and clinical examination, urine culture and UDS.

MAIN OUTCOME MEASURES: Correlation between Arabic UDI-6 questionnaire score and urodynamic diagnosis.

RESULTS: Eighty-seven women with a mean age of 57 (range, 22-72) years completed the UDI-6 and underwent UDS. The questionnaire revealed that 20 (23%) patients had urge incontinence, 28 (32%) had stress incontinence and 39 (45%) had mixed incontinence. As diagnosed by UDS, 26 (30%) had urge incontinence, 37 (42%) had stress incontinence, 16 (18%) had mixed incontinence and 8 (9%) had no abnormality. Eighty-six percent of patients (24/28) with pure stress urinary incontinence (SUI) symptoms had a positive UDS, and 55% (11/20) of patients with pure urge incontinence symptoms had a positive UDS. Of all patients with positive response to the question for SUI, 53/67, 79% had positive UDS diagnosis with a correlation coefficient of 0.65 ($P < .01$). Of all patients with positive responses for urge incontinence, 27/59, 45.8% had positive UDS diagnosis with a moderate correlation coefficient of 0.38 ($P < .01$).

CONCLUSIONS: The validated Arabic UDI-6 correlates significantly with UDS findings in Arabian women, particularly in women with SUI.

LIMITATIONS: The sample size was relatively small, which prevented sub-analyses. Patient comorbidities were not evaluated.

Urinary incontinence is a common, bothersome problem that is often not reported, especially in women.^{1,2} The estimated prevalence is up to 51%.³ Urinary incontinence is a well-known cause of impaired quality of life, including impairments in physical, social, and role functioning, mental health, and general health perception.^{4,5} Urinary incontinence is also a cause of several morbidities, including perineal

Candida infections, cellulitis, pressure ulcers, urinary tract infections, urosepsis, and falls and fractures from slipping on urine.⁶ Several etiologies for urinary incontinence have been characterized, including pelvic floor dysfunction, neuro-urologic pathologies, age-related causes, medications and cognitive impairment.⁷

Several characterizations of urinary incontinence and associated lower urinary tract symptoms have been

standardized. Although they are not always specific for certain pathologies, they are important to determine possible etiologies and to act as a guide for appropriate investigations and management plans.^{1,8} These characterizations include stress urinary incontinence (SUI), urge urinary incontinence, mixed urinary incontinence, enuresis and continuous urinary incontinence.¹

For an objective clinical assessment of urinary incontinence, many questionnaires have been developed to enable an appropriate evaluation of symptoms, degree of distress, and quality of life. The Urogenital Distress Inventory-6 (UDI-6) questionnaire is a short form of the 19-item Urogenital Distress Inventory questionnaire that has been widely used to assess types of urinary incontinence and its effect on quality of life. The UDI-6 has been validated in many languages, including Arabic,⁹ and it correlated well with the original 19-item questionnaire.¹⁰ The correlation between the patient symptoms and urodynamic findings, however, has been questioned by some investigators.^{11,12} Although urodynamic studies (UDS) provide accurate, objective measures of various aspects of urine storage and evacuation,¹³⁻¹⁵ they are invasive and carry a risk of urinary tract infection of up to 15%.¹⁶ The studies are accompanied by significant physical and psychological impact on patients, namely, embarrassment, pain and distress.¹⁷ These caveats prompted a search for a less invasive method to predict UDS findings in women with urinary incontinence. Several investigators have studied the correlation between urodynamic findings and different questionnaires with mixed results.¹⁸⁻²¹ The UDI-6 might predict urodynamic findings.¹⁸ Our aim in this study was to correlate the validated Arabic version of the UDI-6 with urodynamic findings in Saudi Arabian women presenting with urinary incontinence, as there is no previous study in our population.

METHODS

In this prospective study we included all women with a history of urinary incontinence who presented to our tertiary referral urology clinic between July 2013 to March 2014. All women completed the Arabic UDI-6 and had a urine culture prior to urodynamic evaluation. Women with a urinary tract infection at the time of the UDS appointment did not proceed to UDS and were treated and rescheduled after being determined to be infection-free. As stated all women with urinary incontinence were included. Exclusion included only women with UTI. The project was approved by the IRB (The Impact of Renal Angiomyolipoma on Estimated Glomerular Filtration Rate in Patients with Tuberous Sclerosis Complex. RAC Proposal # 2041011) (Relationship be-

tween urinary incontinence symptoms and urodynamic findings using a validated Arabic questionnaire. RAC Proposal #2161046). There was no funding. All women were investigated using Laborie Urodynamics, Aquarius system, (Laborie, Canada). UDS was performed with the woman in a supine position using a 6Fr urethral catheter and 9Fr rectal catheter. The bladder was filled with room temperature normal saline at 60 mL/min. Filling was stopped when the patient developed a strong desire to urinate or 600 mL had been infused into the bladder. The women were asked to cough once every minute to ensure subtraction and to test for stress incontinence. Provocative maneuvers were employed with the women standing, such as coughing up to five times or listening to running water. At the end of filling, women were seated for a pressure flow study and post-void residual measurement. A urodynamic diagnosis of urodynamic SUI, detrusor overactivity (DO) and mixed urinary incontinence was made according to the International Continence Society definition.¹

The required sample size was calculated with different levels of accuracies and marginal errors with a 95% confidence level for estimating various effect sizes with 80% power. A correlation analysis was carried out between individual items on the UDI-6 questionnaire and UDS findings. Statistical analysis using the Pearson correlation coefficient and chi-square test were performed with SPSS 11.0 software (SPSS, Inc, Chicago, IL).

RESULTS

Eighty-seven women with a mean age of 57 (range 22-72) years completed the Arabic UDI-6 and underwent UDS. All women presented with the chief complaint of urinary incontinence. The majority had mixed incontinence followed by stress incontinence (**Table 1**). The most common urodynamic diagnosis was SUI followed by DO, mixed incontinence and negative study findings (**Table 2**). Sixty-seven patients had SUI symptoms based on question 3 of the UDI-6 (both mixed and pure SUI) (**Table 3**). Upon UDS, 53 of these patients (79%) had a positive SUI, while 23 (30%) did not leak during the test ($P < .001$). This is in contrast to 28 patients with pure SUI on question 3 of whom 24 (86%) had a positive UDS diagnosis of SUI.

We evaluated the relationship between urge incontinence questions 1 and 2 in the UDI-6 versus a UDS diagnosis of DO. Fifty-nine patients had symptoms of pure and mixed urge incontinence. Of these patients, 27/59, (45.8%) showed DO in the UDS ($P < .001$). In contrast, 11/20 (55%) of patients with a history of pure urge incontinence demonstrated UDS evidence of DO. Patients with mixed incontinence symptoms had

a lower rate of UDS diagnosis of SUI and DO (Table 3). Interestingly, 14% of patients had a negative UDS diagnosis. The correlation between question 3 and UDS was moderate, whereas the correlation was fair for questions 1 and 2 (Table 4).

DISCUSSION

The UDI-6 is a questionnaire with six questions used to assess the symptoms of urinary incontinence. It correlates with the original 19-item UDI.¹⁰ Arabic validation was performed by Altaweel et al.⁹ We evaluated the correlation between the Arabic UDI-6 and UDS findings. Lemack and Zimmern have evaluated this correlation using the English version of the UDI-6.¹⁸ Our sample population has a high rate of mixed urinary incontinence, probably due to the nature of our tertiary referral center. This might be different than the true prevalence of incontinence in the general population. The UDS finding of SUI was the most common, possibly due to the high fertility rate in Saudi Arabia. DO was found to be the second most common, which might be explained by the high prevalence of diabetes mellitus in Saudi Arabia.^{22,23}

The Arabic UDI-6 was found to correlate well with UDS findings related to SUI, with 86% of pure SUI patients having positive UDS results. This finding was also similar to the results of Lemack and Zimmern (85%).¹⁸ However, 10% of our patients did not leak during UDS, which might be explained by either mild SUI or due to positioning and non-physiologic maneuvers, such as the Valsalva maneuver during the urodynamic study.

Fifty-five percent of our patients with pure urge incontinence symptoms demonstrated DO, which can be considered a good correlation, with findings similar to the Lemack and Zimmern study (46%).¹⁸ This percentage might be altered if we stratified the severity of the symptoms, which we could not do because of our limited sample size.

In patients with mixed urinary incontinence symptoms, 51% and 35% had a urodynamic diagnosis of SUI and DO, respectively. Lemack and Zimmern reported similar findings (50% and 35.2% for SUI and DO, respectively).¹⁸ This finding reflects the multiplicity of factors playing a major role in the pathophysiology of mixed urinary incontinence.²² In this group of patients, we did not stratify the severity of each question to indicate the dominant symptom and correlate it with UDS

Table 1. Patient symptoms and percentages based on the Urogenital Distress Inventory 6 (N=87).

Symptoms	n (%)
Mixed Incontinence	39 (44.8)
Stress incontinence	28 (32.2)
Urge incontinence	20 (23)

Table 2. Urodynamic findings (N=87).

Urodynamic finding	(n) %
Stress incontinence	37 (42.5)
Urge incontinence	26 (29.9)
Mixed incontinence	16 (18.4)
No finding	8 (9.2)

Table 3. Incontinence symptoms and urodynamic findings (N=87).

Symptoms of urinary incontinence	n	UDS findings (%)	
		SUI	DO
Stress incontinence	28	86	12
Urge incontinence	20	9	55
Mixed incontinence	39	51	35

SUI: stress urinary incontinence, DO: detrusor overactivity

Table 4. Sensitivity and specificity of the UDI-6 for predicting urodynamic findings.

UDI-6	Finding	Sensitivity %	Specificity %	Positive predictive value %	Correlation coefficient	P
Stress urinary incontinence Question ³	SUI	74	70	70	0.65	<.01
Urge incontinence /frequency Questions ^{1,2}	DO	87	72	60	0.38	<.01

Statistical analysis using the Pearson correlation coefficient and chi-square test were performed.

findings because of the small sample.

The sensitivity and specificity of SUI symptoms to detect SUI in UDS was fairly high, reaching 74% and 70%, respectively, with a good correlation coefficient, which makes the use of the UDI-6 an excellent screening tool for the diagnosis of SUI, enabling non-surgical management of SUI without a UDS study. If surgery is considered, UDS would be necessary to rule out occult DO.

Our study was unique in comparing urodynamic findings to UDI-6 in a language other than English, but the study was not without limitations. Our sample size was relatively small, which limited our ability to perform a subset analysis. We did not classify the scores of the question items, which might provide more information on mixed urinary incontinence domains. The patient population of a tertiary referral center would not provide a true prevalence of urinary incontinence patterns

in the general community. Evaluation of patient comorbidities, such as diabetes mellitus or neurological diseases and previous parity or pelvic floor injuries, were not studied. A larger scale study that includes patients with associated comorbidities is recommended to clarify the specific patterns of urodynamics and its correlation with patient-completed questionnaires.

In conclusion, the short form of the Urogenital Distress Inventory (UDI-6) is an easily completed questionnaire, validated in Arabic, and positively correlated with urodynamic findings with good specificity and sensitivity for stress urinary and urge incontinence. This questionnaire can be used for diagnosis and conservative management without the need for urodynamic evaluation, which is particularly true in patients with SUI.

Conflict of interest

The authors report no conflict of interest.

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