

Validity and Reliability of the Thai version of the International Consultation on Incontinence Questionnaire – Female Lower Urinary Tract Symptoms Long Form (ICIQ-FLUTS LF) and Its Correlation with the IPSS

Parm Tohroonglert, M.D.¹, Valeerat Swatesutipun, M.D.²

¹Division of Urology, Faculty of Medicine, Thammasat University, Pathumthani, Thailand, ²Division of Urology, Thammasat University Hospital, Thammasat University, Pathumthani, Thailand.

ABSTRACT

Objective: Incontinence Modular Questionnaire on Female Lower Urinary Tract Symptoms Long form (ICIQ-FLUTS LF) is a robust psychometric tool to assess the severity of lower urinary tract symptoms (LUTS) in women. A Thai language version of the ICIQ-FLUTS LF is available, but it had not been validated yet. This study aimed to validate the ICIQ-FLUTS LF questionnaire in Thai and to identify the correlation between the ICIQ-FLUTS LF and the IPSS.

Materials and Methods: We recruited 130 females, 50 with LUTS were recruited from patients visiting the Urology Clinic to assess the test with known group validity. They completed the ICIQ-FLUTS LF twice, two weeks apart, and the IPSS once. Meanwhile, 80 without LUTS (control group) were recruited from relatives of the patients to increase the consistency of the statistical analysis, completed the ICIQ-FLUTS LF. Then validity and reliability were determined using statistical analysis.

Results: Convergent validity showed a moderate correlation between ICIQ-FLUTS LF and IPSS for both storage and voiding symptoms, with Pearson's correlation coefficient 0.49, 0.66; $P < 0.001$, respectively. Construct validity, using the Wilcoxon signed-rank test, demonstrated statistically significant difference between the target group and the control group ($P < 0.001$). The Thai version of the ICIQ-FLUTS LF showed good internal consistency, with Cronbach's alpha coefficients 0.76-0.79 and Test-retest reliability strong, with weighted kappa values 0.63 to 0.90.

Conclusion: The Thai version of the ICIQ-FLUTS LF shows good validity and reliable measures of females with LUTS, and it is simple to use. This questionnaire in the Thai version can be used in clinical practice and academic research.

Keywords: Lower urinary tract symptoms; Female LUTS; ICIQ-FLUTS LF; validate questionnaire (Siriraj Med J 2024; 76: 262-271)

INTRODUCTION

The International Continence Society (ICS) defined lower urinary tract symptoms (LUTS) as symptoms related to the lower urinary tract. The symptoms may originate from the bladder, urethra, prostate (men) and/

or adjacent pelvic floor or pelvic organs, or from similarly innervated anatomy, e.g., lower ureter.¹ LUTS commonly occur in patients who have pathological lower urinary tract organs, which include storage symptoms, voiding symptoms and post-micturition symptoms. LUTS are

Corresponding author: Valeerat Swatesutipun

E-mail: valeerat@gmail.com

Received 8 February 2024 Revised 18 March 2024 Accepted 21 March 2024

ORCID ID: <http://orcid.org/0000-0002-6394-520X>

<https://doi.org/10.33192/smj.v76i5.267706>



All material is licensed under terms of the Creative Commons Attribution 4.0 International (CC-BY-NC-ND 4.0) license unless otherwise stated.

not life-threatening but can negatively affect quality of life, leading patients to seek treatment. Sometimes, if found together with red flag signs such as hematuria, LUTS can be symptoms of dangerous diseases like bladder cancer.² Physicians should investigate the causes of the symptoms because various pathologies, for example, overactive bladder or vesical stone, can cause LUTS in women. Many tools have been developed to help physicians diagnose the disease, assess LUTS severity, and guide appropriate treatment, but they have some limitations for use in daily clinical practice and research. The International Prostate Symptoms Score (IPSS) is one of those tools. It is a questionnaire which is widely used to assess the severity of LUTS in both males and females. However, the IPSS was originally developed to assess LUTS in men with benign prostatic hyperplasia and does not have a module about incontinence which is an important and the most bothersome symptom.² Moreover, some important questions for evaluating female LUTS are not included in the IPSS. Therefore, in the past, urologists lacked of good questionnaire to assess all varieties of aspects of LUTS in females.

The International Consultation on Incontinence (ICI), which is sponsored by the WHO, developed a fully validated international standard questionnaire for lower urinary tract dysfunction. It includes modules to assess pelvic problems, is applicable to clinical practice and to research, and allows cross-comparisons.³ Furthermore, the questionnaires for assessing LUTS have been designed with consideration for gender differentiation.

The International Consultation on Incontinence Modular Questionnaire on Female Lower Urinary Tract Symptoms long form (ICIQ-FLUTS LF) is a high-quality robust questionnaire of the ICIQ series. It was created to evaluate the severity of LUTS in women, and it can be used throughout the world for both clinical practice and research. The questions are simple, easy to understand, and can be self-completed by the patient. ICIQ-FLUTS LF has been translated and validated in various languages, for example, Tamil and Sinhala. In Thailand, sixty-six million people use Thai for daily life and as the official language.⁴ Recently, patients with LUTS in Thailand either receive an overestimated or underestimated evaluation of severity due to lacking of a standardized tool to help guide the clinical practitioner in accurate diagnosis and such a tool has not been realized yet. Moreover, Thai urologists lack of well-validated questionnaires in Thai for evaluating LUTS specifically tailored for females. Leading to inadequate assessment of the severity, causes, and efficacy of the treatment of LUTS in Thai women. To date, the ICIQ-FLUTS LF is available in Thai but it

has not been validated yet. This study aimed to validate the ICIQ-FLUTS LF questionnaire in the Thai language and to identify the correlation between ICIQ-FLUTS LF and IPSS. We have chosen the IPSS as the comparative questionnaire due to its widely and long-standing usage, simplicity, and has been validated in Thai (21). Moreover, IPSS consists of questions concerning storage, voiding, and postmicturition symptoms, which are somewhat similar to those in the ICIQ-FLUTS LF, albeit with less detail compared to the latter.

MATERIALS AND METHODS

This is a prospective study to evaluate the validity and reliability of the ICIQ-FLUTS long form questionnaire. Permission was granted from the ICIQ Development Group, Bristol Urological Institute to translate into Thai and adapt the questionnaire. The Research Ethics Committee of the Faculty of Medicine, Thammasat University approved the experiment. All participants provided signed informed consent.

Participants

The participants were divided into two groups, the target group and the control group. For questionnaire validation, the optimal number of participants in the target group was 50. During January to December 2023, we recruited 130 female participants, 50 with LUTS for the target group and 80 without relevant symptoms for the control group. Having 80 participants in the control group increased the consistency of the statistical analysis.⁵ To assess the test in a population with known group validity, we recruited females with LUTS from patients visiting the Urology Clinic of Thammasat University Hospital, Pathum Thani, Thailand. The inclusion criteria were (a) age 18 years or older, (b) chief complaint of lower urinary tract symptoms, and (c) ability to read and understand Thai language. The exclusion criteria were (a) unable to answer the questionnaire twice with an interval of two weeks and (b) diagnosed with urinary tract calculi, urinary tract infection or urinary tract cancer.

For the control group, we recruited participants from relatives of the patients at the urology clinic. The inclusion criteria were (a) age 18 years or older, (b) no history of lower urinary tract symptoms, (c) no history of lower urinary tract disease, and (d) ability to read and understand Thai language.

We took note of the potential of bias in recruiting the population. In control group, the participants were recruited from the relative of the visiting patients in outpatient department. Usually, the caretaker or relative

accompanying patients were younger of age than patients themselves. But overall the method of recruiting still be able to achieve randomization to eliminate the potential occurrence of bias.

Instrument

ICIQ-FLUTS LF is an instrument to evaluate in females the severity of symptoms and the quality of life associated with LUTS. The questionnaire has 18 items with two questions in each item. The first question asks about the severity of LUTS using a Likert scale (with 0 being the least and 4 the most severe). The other questions allow participants to rate their quality of life between 0-10, where 0 means “not bothersome at all” and 10 means “very bothersome.”

This study also uses the International Prostate Symptom Score (IPSS) for comparison to determine the validity of the ICIQ-FLUTS LF. The IPSS consists of 7 questions related to lower urinary tract symptoms. The IPSS is a validated, reproducible scoring system which has long been used worldwide to assess disease severity. Both questionnaires are self-completed by subjects.

Procedure

All participants completed their questionnaires at Thammasat University Hospital and provided their ages as demographic data. Participants in the target group completed both the ICIQ-FLUTS LF and the IPSS questionnaires. Participants in the control group

completed only the ICIQ-FLUTS LF. For test-retest reliability, all participants in the target group completed the questionnaires again after two weeks (Fig 1).

Statistical analysis

The convergent validity (how closely a test is related to other tests that measure the same or similar constructs) was determined by comparing the ICIQ-FLUTS LF scores of the target group with a known validated questionnaire. In this study we used the International Prostate Symptom Score (IPSS) as the comparison test. The comparisons were performed using Pearson's correlation.

The construct validity (a parameter that defines how well a test measures what it is intended to measure) was determined by comparing the ICIQ-FLUTS LF scores of the target group with the ICIQ-FLUTS LF scores of the control group. In order to easily compare between the target group and the control group, we organized the questions in the questionnaire into six subscales which were storage, voiding, incontinence, bladder pain, post micturition, and ability to stop voiding. The comparisons were performed using the Wilcoxon signed-rank test.

The internal consistency (a parameter that verifies correlations between items within a subscale or domain) was assessed by using Cronbach's alpha coefficients. The assessment was done in each domain of the instrument. If Cronbach's alpha coefficients were between 0.7 and 0.95, the instrument was considered to have good internal consistency.

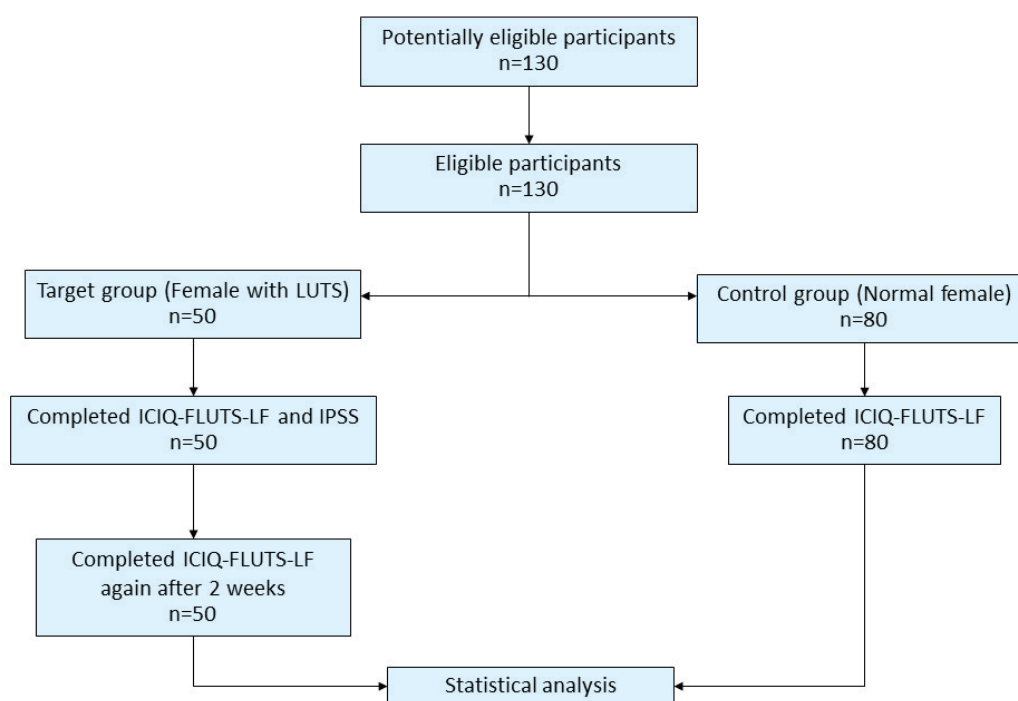


Fig 1. Flow of participants through the study

The test-retest reliability (a property of producing repeated measurements that are consistent) was verified by having the participants of the target group answer the questionnaire twice with an interval of 2 weeks between the evaluations. We calculated test-retest reliability by using weighted kappa (κ).

STATA statistical Software Version 15 (StataCorp, College Station, Texas) was used for data analysis, with P-value of 0.05 considered statistically significant.

RESULTS

Demographic data

The mean age was 54.9 years in the LUTS group and 40.4 years in the control group. The difference was statistically significant, as shown in Table 1.

For the three most common diagnosis in the LUTS group, overactive bladder was the highest at 30 (60%), followed by nocturnal polyuria at 7 (14%), and pelvic organ prolapse at 5 (10%).

Construct validity

The differences between the median ICIQ-FLUTS LF scores of the LUTS group and those of the control group were statistically significant ($p < 0.001$) for all six subscales, as shown in Table 1.

Convergent validity

Convergent validity between ICIQ-FLUTS LF and IPSS was evaluated with voiding symptoms and with storage symptoms. The Pearson's correlation coefficient

for voiding symptoms was 0.66 ($P < 0.001$) (moderate correlation) (Fig 2), and for storage symptoms it was 0.49 ($P < 0.001$) (moderate correlation) (Fig 3).

Reliability

Internal consistency

Internal consistency was assessed using Cronbach's coefficient alpha score, which ranged from 0.76 to 0.79 for the 18 questions (Table 2).

Test-retest reliability

Test-retest reliability was assessed by using weighted kappa, which ranged from 0.63 to 0.90 for the 18 questions (Table 2).

Correlation between each of questions in each module (storage, voiding, and incontinence)

For the correlation between each of questions about storage symptoms, each of questions in this module showed weak to moderate correlation. Nocturia has a moderate correlation with urgency ($r = 0.44$) but weak correlation with the frequency (0.24) as shown in Table 3. For voiding symptoms, hesitancy demonstrated moderate correlation with straining to void ($r = 0.53$) but weak correlation with others. Also, intermittency showed moderate correlation with dysuria ($r = 0.58$) whereas showed weak correlation with others (Table 4). For incontinence symptoms, most of the questions in this group demonstrated moderate to good correlation between each other ($r = 0.41$ -0.63) as shown in Table 5.

TABLE 1. Construct validity between females with LUTS and the control group.

ICIQ-FLUTS	Control group (N=80)	LUTS group (N=50)	p-value
Age, year, mean (SD)	40.4 (15.8)	54.9 (15.2)	< 0.001
Storage score, median (IQR)	2 (1-3)	5 (4-8)	<0.001
Voiding score, median (IQR)	0 (0-2)	4.5 (2-7)	< 0.001
Incontinence score, median (IQR)	0 (0-2)	4 (1-6)	<0.001
Bladder pain score, median (IQR)	0 (0-1)	1 (0-2)	<0.001
Post-micturition score, median (IQR)	0 (0-1)	1 (0-2)	<0.001
Ability to stop urine flow score, median (IQR)	0 (0)	1 (0-2)	0.028

Abbreviation: N, number; SD, standard deviation; IQR, interquartile range

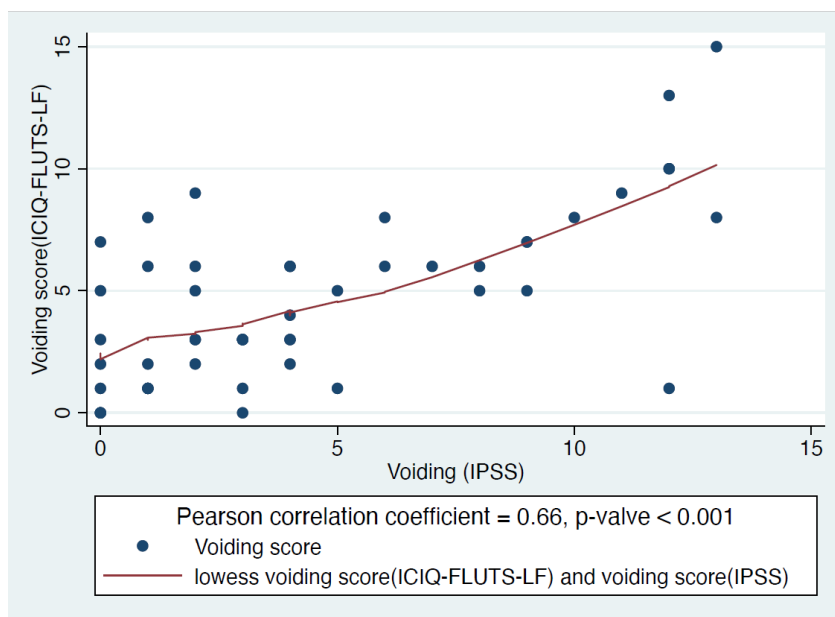


Fig 2. Convergent validity demonstrated in the Pearson's correlation coefficient between ICIQ-FLUTS LF and IPSS in voiding symptoms score.

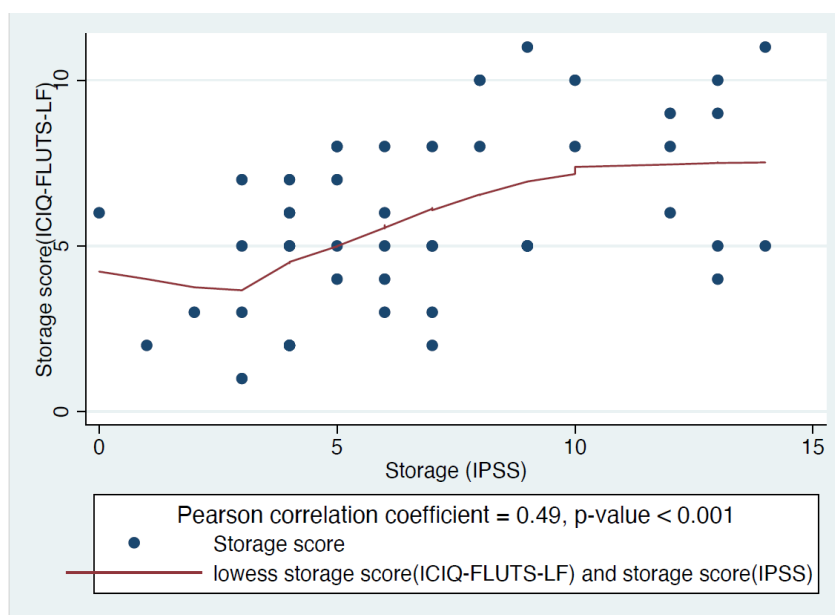


Fig 3. Convergent validity demonstrated in the Pearson's correlation coefficient between ICIQ-FLUTS LF and IPSS in storage symptoms score.

DISCUSSION

Symptoms caused by urinary tract diseases are common in females of all ages. The EPIC study demonstrated a high prevalence of LUTS in women; 59.2% of women had storage symptoms, 19.5% had voiding symptoms, and 14.2% had post-micturition symptoms. The prevalence of symptoms increased with age.⁶ Specific co-morbidities such as history of vaginal delivery or hysterectomy, post-menopausal status, high BMI, arthritis, depression, hypertension, and neurological conditions are also associated with female LUTS.⁸ Women experience lower urinary tract pain more than men. Many patients seek treatment for LUTS, but current management cannot improve the symptoms.⁷ The most reported risk factor for LUTS in both males and females is increasing age, which this study demonstrated as well. Most previous

studies examining prevalence, risk factors, and comorbid conditions associated with LUTS used the Bristol Female LUTS (BFLUTS) questionnaire for women. A more expansive view, including a broader collection of symptoms would improve clinical recognition and management of LUTS.⁹ Female LUTS have been significantly associated with reduced work productivity (OR 1.11), presenteeism (OR 1.10), and activity impairment (OR 1.11).¹⁰

Although several questionnaires have been developed to measure varying aspects of LUTS, no symptom index has been generally accepted, and no single tool can evaluate all aspects of LUTS in women. An ideal questionnaire should determine the cause of the problem, the frequency and extent of symptoms, and the impact on patient's activities and well-being. It should be inexpensive. It should not require invasive studies. It should track treatment

TABLE 2. Internal consistency (demonstrated in Cronbach's coefficient alpha score) and Test-retest reliability (demonstrated in weighted kappa value) in females with LUTS.

The question in an original version (English)	The question in Thai version	Cronbach's coefficient alpha scores (N=50)	Weighted kappa (κ) (N=50)
2. How often do you pass urine during the day?	ในแต่ละวัน คุณถ่ายปัสสาวะบ่อยแค่ไหน	0.79	0.75
3. During the night, how many times do you have to get up to urinate, on average?	ในตอนกลางคืน คุณจำเป็นต้องลุกขึ้นมาถ่ายปัสสาวะโดยเฉลี่ยเป็นจำนวนกี่ครั้ง	0.77 0.78	0.89 0.80
4. Do you have a sudden need to rush to the toilet to urinate?	คุณจำเป็นต้องรีบวิ่งเข้าห้องน้ำเพื่อไปปัสสาวะหรือไม่		
5. Does urine leak before you can get to the toilet?	คุณมีอาการปัสสาวะเล็ดก่อนที่จะไปถึงห้องน้ำหรือไม่	0.78	0.79
6. Do you have pain in your bladder?	คุณมีอาการปวดกระเพาะปัสสาวะหรือไม่	0.77	0.90
7. How often do you leak urine?	คุณปัสสาวะเล็ดบ่อยแค่ไหน	0.77	0.78
8. Does urine leak when you are physically active, exert yourself, cough or sneeze?	คุณมีอาการปัสสาวะเล็ดในเวลาที่มีการเคลื่อนไหว ขยับร่างกาย, ออกแรง, ไอหรือจามบ้างหรือไม่	0.76	0.90
9. Do you ever leak urine for no obvious reason and without feeling that you want to go?	คุณมีอาการปัสสาวะเล็ดโดยไม่มีสาเหตุที่แน่ชัด และโดยที่ไม่รู้สึกปวดปัสสาวะบ้างหรือไม่	0.76	0.63
10. How much urinary leakage occurs?	คุณมีปัสสาวะเล็ดในปริมาณเท่าใด	0.77	0.79
11. Is there a delay before you can start to urinate?	มีการหน่วงเวลาก่อนที่คุณจะเริ่มถ่ายปัสสาวะหรือไม่	0.76	0.78
12. Do you have to strain to start urinating?	คุณต้องเบ่งเพื่อที่จะถ่ายปัสสาวะหรือไม่	0.76	0.80
13. Do you stop and start more than once while you urinate?	ในขณะที่คุณถ่ายปัสสาวะ คุณต้องหยุดและเริ่มใหม่มากกว่าหนึ่งครั้งหรือไม่	0.76	0.80
14. Do you leak urine when you are asleep?	คุณมีปัสสาวะเล็ดขณะนอนหลับหรือไม่	0.77	0.80
15. Would you say that the strength of your urinary stream is...	คุณคิดว่าความแรงในการถ่ายปัสสาวะของระบบทางเดินปัสสาวะของคุณนั้น...	0.78	0.74
16. Have you ever blocked up completely so that you could not urinate at all and had to have a catheter to drain the bladder?	คุณเคยมีอาการทางเดินปัสสาวะถูกอุดกั้นอย่างสิ้นเชิงจนไม่สามารถปัสสาวะได้เลย และต้องมีการเสียบสายสวนเพื่อระบายปัสสาวะจากกระเพาะปัสสาวะหรือไม่	0.79	0.78
17. Do you have a burning feeling when you urinate?	คุณมีอาการปวดแสบปวดร้อนเวลาปัสสาวะหรือไม่	0.77	0.89
18. How often do you feel that your bladder has not emptied properly after you have urinated?	คุณรู้สึกว่าปัสสาวะไม่หมดหลังจากที่คุณถ่ายปัสสาวะบ่อยครั้งแค่ไหน	0.78	0.78
19. Can you stop the flow of urine if you try while you are urinating?	คุณสามารถหยุดการไหลของปัสสาวะในระหว่างที่คุณกำลังปัสสาวะได้หรือไม่	0.77	0.83

TABLE 3. The correlation matrix demonstrated in the Pearson's correlation coefficient values between each of questions about the storage symptoms.

	Question 2	Question 3	Question 4
Question 2	1		
Question 3	0.2488	1	
Question 4	0.2081	0.4416	1

TABLE 4. The correlation matrix demonstrated in the Pearson's correlation coefficient values between each of questions about the voiding symptoms.

	Question 11	Question 12	Question 13	Question 15	Question 16	Question 17
Question 11	1					
Question 12	0.5312	1				
Question 13	0.372	0.2728	1			
Question 15	0.3012	0.492	0.1431	1		
Question 16	0.2008	0.4468	0.2024	0.3536	1	
Question 17	0.2798	0.2731	0.5815	0.1398	0.0922	1

TABLE 5. The correlation matrix demonstrated in the Pearson's correlation coefficient values between each of questions about the incontinence symptoms.

	Question 5	Question 7	Question 8	Question 9	Question 10	Question 14
Question 5	1					
Question 7	0.3089	1				
Question 8	0.4174	0.4649	1			
Question 9	0.3836	0.2435	0.6366	1		
Question 10	0.3786	0.2992	0.6143	0.2583	1	
Question 14	0.2481	0.3516	0.6102	0.6333	0.2236	1

outcome. It should be easy for the general population to use. And it should be relevant to clinical practice. Paul Abrams stated four characteristics of good symptom questionnaires “ (1) The questionnaire should be facile; (2) Each item of the questionnaire should have a known causal relationship to the condition being measured; (3) The score should help determine appropriate therapeutic options; (4) Use of the questionnaire should directly improve patient management, and this effect should be demonstrable”.¹¹

The International Prostate Symptom Score (IPSS) is a screening tool commonly used by urologists to evaluate and monitor LUTS in both males and females; however, it was originally developed and validated to assess treatment efficacy in men with benign prostatic hyperplasia. Lower urinary tract pathology differs between males and females, particularly incontinence and urgency. The IPSS excludes urinary incontinence from the questionnaire. Advantages of IPSS are that it is simple to use, is short, and has severity cut-off levels. However, some important questions for evaluating female LUTS are not included in the IPSS, so supplementary questionnaires such as LUTS tool, BFLUTS, etc. were created to better assess female LUTS.¹²

A population study used the ICIQ-FLUTS (short form) to investigate the prevalence of LUTS in nulligravid women. This helped researchers understand how women not seeking care for LUTS respond to the questions. Good tools are necessary for high quality research regarding epidemiology, diagnosis and management of LUTS.¹³ In comparison to recent validation of the study of ICIQ-FLUTS short form (22), this questionnaire has 12 items instead of 18 items from ICIQ-FLUTS long form. One of its strength is the ability to be completed within a short period of time, making it less burden to complete compared to the long form. Though the study itself mentioned that its lack of the ability to detect changes of clinical status is the one such limitation that the study has.

The ICIQ-FLUTS LF consists of the 18 items that evaluate frequency, nocturia, nocturnal enuresis, urgency, urge urinary incontinence, frequency of urinary incontinence, stress incontinence, unexplained urinary incontinence, amount of urinary leakage, hesitancy, straining to start urination, intermittency, nocturnal enuresis, strength of stream, urinary retention, dysuria, incomplete emptying, ability to stop urine flow, and bladder pain. All of these topics are relevant to lower urinary tract symptoms and causes of LUTS in women.³

This is the first study to assess the validity and reliability of ICIQ-FLUTS long form in the Thai language.

We demonstrated a moderate correlation between ICIQ-FLUTS LF and IPSS. Both questionnaires evaluate lower urinary tract symptoms, but they have different subdomains, especially in the domains of urinary incontinence and bladder pain. Therefore, their results should correlate to some degree, i.e., they should share the same general concept but not be identical. For reliability, we found good internal consistency for the ICIQ-FLUTS LF; Cronbach alpha ranged 0.76-0.79, which was similar to previous studies. For test-retest reliability, kappa values for individual items ranged from 0.63 to 0.90, indicating adequate reliability, which was also similar to previous studies.¹⁴⁻²⁰ The Cronbach alpha and kappa values in our study were lower than in some previous studies. This might be because some previous studies collected data in specific populations; for example, the Tamil version collected data in pelvic organ prolapse and incontinence patients. LUTS in these groups would differ more from their control groups than in our study, which tested general female LUTS patients.

The clinical significance of the observed correlations and reliability measures in this study may be exemplified by the specific characteristics of the target group participants experiencing LUTS. Among them, 30 were diagnosed with overactive bladder, 7 exhibited nocturnal polyuria, and 5 presented with pelvic organ prolapse.

A limitation of our study was lack of other demographic data such as parity, menopausal status, pelvic organ prolapses, underlying diseases, education status, etc., which would yield more clarity and information regarding both groups. Further studies should include this demographic data and a wide range of ages and education levels of participants to provide more accurate information.

Another limitation was this study recruited the participants from women experiencing LUTS who visited the Urology clinic to conduct a known group validity test and recruited the relative of patients as the control group. This haphazard sampling might cause some selection bias and may affect the study's finding. For example, the majority of participants in the control group were younger compared to those in the target group, resulting in a lower score of LUTS than observed in the target group.

The correlation coefficients observed between each question in this study demonstrated a range from weak to moderate correlation. It could be because the questions in the ICIQ-FLUTS LF covering all aspects of the female LUTS. Meanwhile, this study recruited participants who present with LUTS from various diagnosis, such as overactive bladder and stress incontinence. Consequently, this broader spectrum of conditions might lead to lower

correlation values between questions compared to studies focusing on specific patient groups. Therefore, future research aimed at further validating these questionnaires should consider recruiting larger participant cohorts and focusing on specific groups of Lower Urinary Tract Symptoms, such as overactive bladder or stress urinary incontinence. This targeted approach will enhance the applicability and effectiveness of these instruments.

CONCLUSION

Assessing Lower Urinary Tract Symptoms can be challenging, but specialized tools can facilitate in accurate diagnosis and guide appropriate treatment decisions. This is particularly crucial in the context of the Thai population, where access to foreign language versions may be limited. The findings of this study affirm that the ICIQ-FLUTS LF in Thai can be aid in diagnosis and treatment LUTS for Thai women. The Thai version of the ICIQ-LUTS LF is a valid and reliable measure of female LUTS, and it is simple to use. The Thai version of this questionnaire can be used in clinical practice and academic research. Using this questionnaire as a standard tool for initial assessment in outpatient department enables patients to easily self-complete it, facilitating clinical practitioners in selecting personalized and optimal treatment approaches for each individual.

ACKNOWLEDGEMENT

We would like to thank Dr. Teerayut Tangpaitoon for his assistance in statistical analysis.

Author contribution

Both authors are involved in the idea of the study, conceptualization of hypothesis, research operation, research design, data collection, data analysis, statistical analysis, data interpretation, discussion of the results, writing the article, critical revision of the article, contribution in manuscript preparation and editing, final approval of the article.

Ethics

All volunteers signed the consent form. The research was approved by the Human Research Ethics Committee of Thammasat University (Medicine): 067/2566. The protocol number MTU-EC-SU-0-002/66.

Conflict of interest

Both authors have no conflict of interest.

Funding

No funding.

REFERENCES

1. ICS. Lower Urinary Tract Symptom (LUTS): ICS; 2024 [cited 2024 February 4]. Available from: <https://www.ics.org/glossary/symptom/lowerurinarytractsymptomluts?q=LUTS>.
2. Castro-Diaz DR, Dudley; Arlandis Guzman; Bosch, JLH; Costantini, Elisabetta; Cotterill, Nikki; Espuña Pons, Montserrat; Lemos, Nucelio; López-Fando Lavalle, Luis; Shelly, Elizabeth; Yoshida, Masaki. Initial Assessment of Urinary Incontinence in Adult Male and Female Patients. In: Wein; Lcerawa, Abrams P, editors. Incontinence 7th Edition 2023: ICUD ICS; 2023.p.397-435.
3. Group I. ICIQ: Bristol Urological Institute; [cited 2024 February 4]. Available from: <https://iciq.net/>.
4. Administration DoP. Official statistic Registration System: Department of Provincial Administration; 2023 [cited 2024 February 4]. Available from: <https://stat.bora.dopa.go.th/stat/statnew/statyear/#/>.
5. Terwee CB, Bot SD, de Boer MR, van der Windt DA, Knol DL, Dekker J, et al. Quality criteria were proposed for measurement properties of health status questionnaires. *J Clin Epidemiol*. 2007;60(1):34-42.
6. Irwin DE, Milsom I, Hunskaar S, Reilly K, Kopp Z, Herschorn S, et al. Population-based survey of urinary incontinence, overactive bladder, and other lower urinary tract symptoms in five countries: results of the EPIC study. *Eur Urol*. 2006;50(6):1306-14; discussion 14-5.
7. Yang CC, Clemens JQ. Lower Urinary Tract Symptoms: Advances in Women's Urologic Health From MAPP and LURN. *Urology*. 2021;150:223-6.
8. Coyne KS, Kaplan SA, Chapple CR, Sexton CC, Kopp ZS, Bush EN, et al. Risk factors and comorbid conditions associated with lower urinary tract symptoms: EpiLUTS. *BJU Int*. 2009;103 Suppl 3:24-32.
9. Chapple CR, Martinez-Garcia R, Selvaggi L, Toozs-Hobson P, Warnack W, Drogendijk T, et al. A comparison of the efficacy and tolerability of solifenacin succinate and extended release tolterodine at treating overactive bladder syndrome: results of the STAR trial. *Eur Urol*. 2005;48(3):464-70.
10. Lin KY, Siu KC, Lin KH. Impact of lower urinary tract symptoms on work productivity in female workers: A systematic review and meta-analysis. *Neurourol Urodyn*. 2018;37(8):2323-34.
11. Graham CW, Dmochowski RR. Questionnaires for women with urinary symptoms. *Neurourol Urodyn*. 2002;21(5):473-81.
12. Coyne KS, Barsdorf AI, Thompson C, Ireland A, Milsom I, Chapple C, et al. Moving towards a comprehensive assessment of lower urinary tract symptoms (LUTS). *Neurourol Urodyn*. 2012;31(4):448-54.
13. Cox L, Rovner ES. Lower urinary tract symptoms in women: epidemiology, diagnosis, and management. *Curr Opin Urol*. 2016;26(4):328-33.
14. Przydacz M, Dudek P, Chłosta P. Polish versions of the ICIQ-FLUTS and the ICIQ-FLUTS LF: translation, adaptation, and validation of female-specific instruments for evaluation of lower urinary tract symptoms. *Int Urogynecol J*. 2021;32(12):3259-65.
15. Gungor Uğurlucan F, Yasa C, Yuksel Ozgor B, Ayvacikli G, Gunaydin C, Balci BK, et al. Validation of the Turkish version of the ICIQ-FLUTS, ICIQ-FLUTS long-form, ICIQ-LUTS

- quality-of-life, and ICIQ-FLUTS sexual functions. *Neurourol Urodyn.* 2020;39(3):962-8.
16. Ekanayake CD, Pathmeswaran A, Nishad AAN, Samaranayake KU, Wijesinghe PS. Translation and validation of ICIQ-FLUTS for Tamil-speaking women. *Int Urogynecol J.* 2017;28(12):1875-81.
 17. Habiba U, Ikram M, Noor R, Arif A, Bashir MS. Urdu translation and validation of the international consultation on Incontinence Questionnaire-Female Lower Urinary Tract Symptoms (ICIQ-FLUTS). *Int Urogynecol J.* 2023;34(7):1423-8.
 18. Athanasiou S, Grigoriadis T, Kyriakidou N, Giannoulis G, Antsaklis A. The validation of international consultation on incontinence questionnaires in the Greek language. *Neurourol Urodyn.* 2012;31(7):1141-4.
 19. Huang L, Zhang SW, Wu SL, Ma L, Deng XH. The Chinese version of ICIQ: a useful tool in clinical practice and research on urinary incontinence. *Neurourol Urodyn.* 2008;27(6):522-4.
 20. de Silva G, Furukan R, Goonewardene M. Validation of the Sinhala translation of the International Consultation on Incontinence Modular Questionnaire for female lower urinary tract symptoms among women in Sri Lanka. *Int Urogynecol J.* 2017;28(12):1895-9.
 21. Nontakaew K, Kochakarn W, Kijvika K, Viseshsindh W, Silpakit C. Reliability of a Thai version of the International Prostate Symptom Score (IPSS) for the Thai population. *J Med Assoc Thai.* 2014;97(6):615-20.
 22. Chattrakulchai K, Manonai J, Silpakit C, Wattanayingcharoenchai R. Validation of the Thai version of the International Consultation on Incontinence Questionnaire-Female Lower Urinary Tract Symptoms (ICIQ-FLUTS). *Int Urogynecol J.* 2020;31(12):2603-10.