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Voiding Pattern in Thai Female without Lower Urinary Tract Symptoms

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ABSTRACT

Objectives: To study the parameters of voiding patterns in Thai women without lower urinary tract symptoms (LUTS) and to compare the voiding parameters between different age groups and menopausal status.

Materials and Methods: Seventy Thai women who lived or worked in various communities in Thailand without LUTS were invited to participate in the study during May-September, 2015. The volunteers were asked to complete Thai version Urogenital Distress Inventory for screening of LUTS for exclusion. All cases were trained how to collect and record in 3-day bladder diary.

Results: Two hundreds and ten bladder diaries (70 women; 3 days/1 person) were completed by seventy women. The mean ± standard deviation (SD) of age was 48.4 ± 7.9 years, the body mass index was 23.3 ± 4.0 kg/m^2, 25.7% were postmenopausal. The mean ± SD of voiding parameters were: 7.4 ± 2.3 times (24 hrs voiding frequency), 6.5 ± 2.0 times (daytime frequency), and 1,560 ± 627 ml (daily voided volume). The median (interquartile range) of night time frequency was 0.7 (0-3) times. The increasing age was associated with higher 24-hr voiding frequency and daytime voiding frequency.

Conclusion: The voiding parameters of Thai women without LUTS were reported. This data can be used as the tools for selecting Thai women with LUTS for further investigations and treatments. This result can be used as the reference for future research for the LUTS management.

Keywords: bladder diary, Thai women, voiding patterns.

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รูปแบบการถ่ายปัสสาวะในผู้หญิงไทย ที่ไม่มีอาการทางเดินปัสสาวะส่วนล่าง

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บทคัดย่อ

วัตถุประสงค์: *เพื่อหาค่าปกติของรูปแบบการถ่ายปัสสาวะในผู้หญิงไทย โดยหาค่าต่อไปนี้ : จำนวนครั้งที่ปัสสาวะใน 24 ชม., จำนวนครั้งที่ปัสสาวะในช่วงเวลากลางวัน, จำนวนครั้งที่ปัสสาวะในช่วงเวลานอน, ปริมาตรปัสสาวะตลอด 24 ชม., ปริมาณเฉลี่ยของปัสสาวะแต่ละครั้ง, ปริมาตรปัสสาวะที่มากที่สุดต่อครั้ง และหาความสัมพันธ์ของตัวแปรเหล่านี้กับกลุ่มอายุและภาวะวัยทอง*

วัสดุและวิธีการ: *หญิงไทย 70 คน ที่อาศัยอยู่ในประเทศไทย และไม่มีอาการของทางเดินปัสสาวะส่วนล่าง จะได้รับเชิญให้เข้าร่วมศึกษา ในช่วงเดือน พฤษภาคม – กันยายน 2558 อาสาสมัครทำแบบสอบถาม Urogenital Distress Inventory (UDI) ฉบับภาษาไทย จากนั้นได้รับการสอนให้เก็บและบันทึกปัสสาวะในใบบันทึกปัสสาวะ*

ผลการศึกษา: *ได้รับแผ่นบันทึกปัสสาวะคืนรวม 210 แผ่น จากหญิงอาสาสมัคร 70 คน อายุเฉลี่ย 48.4 ปี, ดัชนีมวลกาย 23.3 kg/m^2, มีผู้ที่หมดประจำเดือนแล้ว 18 คน (25.7%) พบว่า ค่าเฉลี่ยของจำนวนครั้งที่ปัสสาวะเท่ากับ 7.4 ± 2.3 ครั้งในหนึ่งวัน การปัสสาวะช่วงกลางวัน 6.5 ± 2.0 ครั้ง และปริมาตรปัสสาวะในหนึ่งวัน เท่ากับ 1,560 ± 627 ซีซี ค่ามัธยฐานของการปัสสาวะช่วงเวลานอน 0.7 (0-3) ครั้ง พบความสัมพันธ์ของอายุและจำนวนครั้งที่ปัสสาวะตลอดวัน และปัสสาวะช่วงกลางวัน*

สรุป: *การศึกษานี้ได้นำเสนอข้อมูลพื้นฐานของลักษณะรูปแบบของการขับถ่ายปัสสาวะในผู้หญิงไทยที่ไม่มีอาการของทางเดินปัสสาวะส่วนล่าง และค่าอ้างอิงที่จะช่วยในคัดเลือกผู้ป่วยที่จะตรวจเพิ่มเติมและดูแลรักษา ทั้งในทางคลินิกและในการวิจัยต่อไป*

คำสำคัญ: *ปัสสาวะ, ผู้หญิงไทย, รูปแบบการถ่ายปัสสาวะ*

Introduction

Lower urinary tract dysfunction is a common problem affecting reproductive and postmenopausal women around the world. Overall prevalence of urinary incontinence was found to range from 25-45%[1]. In Asian population, the prevalence of lower urinary tract symptoms (LUTS) was about fifty-three percent in reproductive-age females[2]. In a community-based study, the urinary incontinence prevalence was reported at 36.5%[3]. The annual cost-of-illness estimation for urinary incontinence in Canada, Germany, Italy, Spain, Sweden, and the United Kingdom was about 7 billion Euro[4]. The steps of investigation in these patient include history and physical examination, patient questionnaires, voiding diaries, urinalysis, post voiding residual urine volume, urodynamic study and pad testing[5]. Only in some situation that initial investigations provide inadequate data, imaging are required. The most LUTS diseases can be diagnosed by initial evaluation.

Voiding diary (sometime called frequency volume chart or bladder diary) is a useful and valuable tool for evaluating patient with lower urinary tract dysfunction such as urgency, urinary incontinence and overactive bladder. This diary is relatively low cost, high effective and non-invasive tool compared to urodynamic studies. However, this tool was not used frequently and the adherence was low[6]. The reasons were lack of standardization (many recording formats), lack of normal value of voiding parameter in each population group, and poor compliance to complete diary. In order to encourage the use of voiding diary, the International Continence Society (ICS) decide to published the standardized voiding diary for international use[7].

The roles of voiding diary include: facilitating history-taking, developing the differential diagnosis, understanding LUTS and complexity of voiding difficulty, assessment the nocturia and provide biofeedback following interventions[8]. Up to now there is no data about the normal voiding pattern in Thai women. The ICS suggested for the publishing of the normal value of voiding pattern in each population group/country so that there will be reference value of the voiding diary to differentiate normal/abnormal pattern for further investigation in the women with LUTS. The aim of this study was to study the parameters of voiding patterns in Thai women without LUTS and to compare the voiding parameters between different age groups and menopausal status.

Materials and Methods

After the Institute Research Ethics Committee approval, 70 Thai women who lived or worked in various communities in Thailand without lower urinary tract symptoms (LUTS) were invited to participate in the study during May - September, 2015. Distributions of samples were matched to the Thai ages and occupation distribution structure from National Statistical Office, 2014. The age distributions were: age 30-39 years: 31%, 40-49 years: 31%, 50-59 years: 23.6%, 60-70 year: 13.8%. The occupation distribution were: officer 37%, farmer 33%, housewife 15%, government officer 15%[9]. The exclusion criteria were: any positive answer (score more than or equal to 1) by Thai version Urogenital distress inventory questionnaires (UDI)[10], recent use of medications with anticholinergic effect, relevant neurologic disorders, uncontrolled medical diseases (e.g. diabetes), previous surgery for incontinence or pelvic organ prolapse, current vaginal pessary use, those who worked primarily at night, and pregnancy or within 3-month postpartum women.

After the written informed consent was obtained and the personal characteristics were recorded, the research nurse explained the study process and answered any additional questions. Volunteers were asked to complete Thai version UDI, then were trained how to collect and record the 3-day Thai version voiding diary by research nurse. The complete records were sealed in pre-paid registered envelope and returned to the researchers.

Sample size calculation

Sample size estimation was calculated based on our pilot study in 10 Thai women without LUTS by Thai version UDI. The parameter that yielded maximum sample size was the number of 24-hr frequency (mean ± standard deviation (SD) = 6.73 ± 1.4 times). The acceptable error was 5 percent of mean of 24-hr frequency (0.34). The calculation sample size was 65.13 (1.96^2*1.4^2 / 0.34^2). Assuming that the 10 percent may loss to follow up or incomplete the voiding diary or having any error in recording the data, the estimation sample size was about 70 cases.

Data analysis and statistics

Statistical analysis was done by using SPSS program version 22.0. Descriptive statistics [mean (SD) or median (interquartile range) and percentage] were used for baseline characteristics. The correlations between age and various voiding parameters were calculated by using Pearson's correlation coefficient. Multivariate analysis with linear regression was applied to determine the effects of menopause and age on the voiding patterns.

Results

Ninety five women were invited into the study, 24 were excluded due to positive UDI and one subject was postpartum woman. Seventy women completed the voiding diaries. The mean age was 48.4 years (35-63 years), the body mass index (BMI) was 23.3 kg/m^2 (18.1-35.8 kg/m^2), and 18 women (25.7%) were menopause. Seventeen women (24%) worked as housekeeper, twenty women (29%) performed agriculture, twenty-three women (33%) were employees and ten (14%) were government officers. Majority of subjects in this study (75%) were sexually active women. (Table 1)

Table 1. Demographic characteristics.

	Mean	SD	Range
Age (years)	48.4	7.9	(35.0 - 63.0)
BMI (kg/m^2)	23.3	4.0	(18.1 - 35.8)
Parity (n)	1.8	1.0	(0.0 - 5.0)
Profession	n (%)		
Housewife	17 (24)		
Agriculture	20 (29)		
Employees	23 (33)		
Government officer	10 (14)		
Menopause	18 (25.7)		
Active sexual intercourse	53 (75.7)		

BMI: body mass index, SD: standard deviation

Subjects voided with a mean ± SD was 7.4 ± 2.3 times in 24 hours, while 95% of women voided less than 12 times. The daytime and night time frequencies were 6.5 ± 2.0 times and 0.7(0-3) times, respectively. The daily voided volume was 1,560 ± 627 ml. The mean ± SD of the voided volume was 191.8 ± 71.1 ml, and the maximum voided volume was higher (381.1 ± 137.2 ml) (Table 2)

Higher age was associated with higher 24-hr

and daytime voiding frequencies (Pearson correlation coefficients = 0.2 and 0.2, p value = 0.015 and 0.028, respectively). A significant negative correlation also found between BMI and these parameters (correlation coefficients = -0.2 and -0.2, p value = 0.02 and 0.06, respectively).

Table 2. Voiding parameter outcome (N=70).

Parameter	Mean ± SD	Range	95th Percentiles
24-hr frequency (times)	7.4 ± 2.3	(3 - 14)	12
Daytime frequency (times)	6.5 ± 2.0	(2 - 11)	10
Night time frequency (times)	0.7	(0 - 3)	3
24-hr voided volume (ml)	1560.5 ± 627.7	(250 - 3550)	2750
Average voided volume (ml)	191.8 ± 71.1	(50 - 500)	306
Maximum voided volume (ml)	381.1 ± 137.2	(100 - 900)	600

SD: standard deviation

Discussion

Voiding diary (or bladder diary) is the important instrument to accurately assess clinical of LUTS. Most guidelines recommend using the diary adjunct to subjective evaluation. There is a clear evidence that a bladder diary is a valid and reliable measurement technique by the psychometric validation[7]. However, until now the literatures of the normative value of voiding parameter have been still sparse. The present study was conducted in community based and using national demographic distribution of age and profession to select the cases that could represent the Thai women in this age group. Previous studies used the simplified questions of the voiding condition for the inclusion criteria[11, 12]. But we decided to use the standardized questionnaire UDI (Thai version) to exclude women with LUTS for the more precise case selection.

From our results, we found the cut off (95th percentiles) for: "increase daytime frequency" as more than 10 times during daytime period, "urinary frequency" as voiding > 12 times in a 24-hr period and "nocturia" define as voiding more than 3 times that preceded and followed by sleep to select case for further investigation in Thai women that suffer for LUTS symptoms.

We found that the cut off value of voiding frequency from our study was similar to some reports (about 7-8 times a day)[12-14] and different in some studies (5-6 times a day)[11, 15]. And the mean voided volume (192±71 ml) from our study was slightly lower than previous studies in Caucasian women[11, 12]. These can be explained by the variations of drinking habit, BMI and races in each population group.

The studies in UK and Taiwan consistent found the mean voiding volume was significantly higher for the night time than in the daytime[13, 15], but not in our study (Table 3). We found the night time voided volume in about the half amount of daytime voided volume (192 ±71 ml vs. 83±97 ml). This can be explained by the sleep disorder, anatomic, lifestyle or climatic differences of Thai female. We also found the higher daytime and 24-hr voiding frequency that increased with increasing age. This aging effect on voiding patterns can be explained by the aging effect: the detachment of urothelial cells, an increase in connective tissue, intermingled with the smooth

muscle fibers in the muscle layer, increased innervation and neurotransmitter release[16], ischemic change[17] and fibrotic change of urinary bladder[18].

Table 3. Comparison of results of present study to other normative studies with asymptomatic women.

Parameter	Larson (1988)	Kassis (1993)	Homma (2000) Percentiles	FitzGerald (2002)	Huang (2006)	Present study
Subjects (N)	151	33	32	300	68	70
24-hr voided volume (ml) (mean ± SD)	1430±487	1473±386	1332±59	1759± 797	1529± 60	1560.5±627.7
Voids per 24 hr (times) (mean ± SD)	5.8±1.4	5.6±1.3	8±0.4	8.3±2.4	7.34±1.63	7.4±2.3
Voided volume (ml) (mean ± SD)	250±79	-	175±8	216±87	225±81	191.8±71.1
Maximum voided volume (ml) (mean ± SD)	460±174	-	277±16	362±161	-	381.0±627.7
Nocturia (% of subjects who reported ≥1 episodes)	15	rare	-	44	-	41

SD: standard deviation

The strength of this study was that we use the new proposed ICS-standardized voiding diary in Thai version, so the finding may be compared with other new studies. And we also used the standardized questionnaires (UDI) to exclude women with LUTS to make the inclusion criteria more accurate.

The limitation of our study was that as our study was designed for the study the normal voiding pattern but not for testing the correlations in each parameters and potential associated factors. Further studies are required to clarify these factors.

Conclusion

The voiding parameters of Thai women without LUTS were reported. This data can be used as the tools for selecting Thai women with LUTS for further investigations and treatments. This result can be used as the reference for future research for the LUTS management in Thai women.

Potential conflicts of interest

The authors declare no conflict of interest.

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