24-Hour Pad Tests in Thai Continent Women

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Background: *Twenty-four hours pad test is a simple tool to establish the differential diagnosis between high amount of vaginal secretion and urinary incontinence, evaluate the severity, and assess the result after treatment in women with urinary incontinence problem. The normal value of 24-hour pad test has been studied in non-Thai population. However, this may be different based on race. Therefore, this value in Thai population is important.*

Objective: *Identify the normal value of 24-hour pad test in Thai continent women by accurately comparing pad's weight before and after use. The secondary objective was to identify the factor associating the amount of vulvo-vaginal secretion.*

Material and Method: *Continent women were screened to exclude urinary incontinence by urogenital distress inventory (UDI-6) questionnaire. Participants were requested to use pad test for 24 hours. During study period, participants were advised to do their routine as usual but avoid exercise and sexual intercourse. Participants were able to change the pads as needed and asked to put the used pad in airtight plastic bag, kept them in a sealed envelope, and sent them to the researcher at their earliest convenience. Once received, the pads were kept in airtight plastic bag and were weighed. Weights were recorded.*

Results: *Two hundred twenty continent women were eligible to participate in the present study to determine the normal value of 24-hour pad test as our reference value. The median of 24-hour pad test was found to be 1.8 g of which the 95 percentiles was 4.7 g. The high amount of vaginal secretion were affected by premenopausal status, hormonal contraceptive used, and duration after menopause less than 5 years, which these factors were associated with estrogen.*

Conclusion: *The authors developed a normal value of the 24-hour pad test that could be used as reference or initial information for further evaluation and diagnosis of urinary incontinence in Thai women.*

Keywords: *24-hour pad test, continence, Female urinary incontinence*

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The International Urogynecological Association (IUGA)/International Continence Society (ICS) Joint Report defined incontinence as "the complaint of any involuntary leakage of urine"[1]. This is one of the most lower urinary tract problems encountered in Thai women. The prevalence of the disease among Asian women is approximately 53.1%[2]. The leakage of the urine can adversely affect women's quality of life, confidence, and daily routine life.

According to the International Continence Society (ICS), demonstration of urinary leakage is required to confirm the diagnosis of incontinence. Severe case of involuntary leakage is experienced in 5 to 10%[3] of adult women. Another 90% of patients may have mild to moderate leakage, which may not affect their daily life routine and may not seek medical advice[3].

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The International Continence Society (ICS) has suggested pad test as the evaluating tool of choice. Pad test can be used to establish the diagnosis, evaluate incontinence severity, and assess the result after treatment. This test quantifies the amount of urinary loss by measuring the increase in pad's weight (pretest and posttest). There are two forms of the test: short-term pad-weighing test (1 hour) and long-term pad-weighing test (24 hours). The short-term pad test normally is performed during office visits. On the other hand, long-term pad test (24 hours) is usually performed at home. Several studies revealed that the 1-hour pad test has lower sensitivity than 24-hour pad test. Twenty-four hours pad test is more appropriate in diagnosing mild urinary incontinence[4,5].

Currently, there are studies determining the normal value of pad test among Australian and Brazilian women to differentiate normal and abnormal value[6,7]. However, those studies may not be fully applied to Thai women because of racial and climate differences that may affect the normal value of pad test. The studies revealed that cold weather decreased the pad test value compared to other studies[6]. This is

because the cold weather decreases sweat and humidity, which affected amount of vulvo-vaginal secretion. The humid weather in Thailand may increase the normal value of pad test because humidity and warm temperature may decrease vaginal secretion evaporation, increase sweat, and the pad may be relatively humid. Therefore, the determination of normal pad test value of Thai continent women is needed. The aim of the present research was to assess the normal value of 24-hours pad test in Thai continent women. The secondary objective was to assess factors affecting the amount of vaginal secretion e.g. menopausal status, hormonal contraceptive use, climates, and occupation, etc.

Material and Method

Two hundred twenty Thai continent women, 30 to 65 years of age, without the symptom of abnormal discharge and completing Thai version of the urogenital distress inventory (UDI-6) questionnaire[8], which consist of experience of frequent urination, urine leakage with feeling urgency, stress urinary incontinence, experience small amounts of urine leakage, difficult to empty bladder and discomfort in lower abdomen or genitalia to exclude urinary incontinence were recruited between June 2013 and May 2014. Sensitivity and specificity of UDI-6 questionnaire was 85% and 79% respectively. The participant enrolled to the present study had to answer "No" to all of the question to confirm no incontinence. The study was approved by the Institutional Review Board, Faculty of Medicine, Chulalongkorn University. Informed consent was obtained from each patient before study enrollment. General information such as age, body weight, height, occupation, marital status, history of medical disease, gynecological history, menopausal status, history of gynecological surgery, hormonal use, contraceptive used, and menstrual period were recorded. Each participant received an envelope containing four pads, airtight plastic bags, instruction sheet, and UDI-6 questionnaire. The pads used in the present study are commercial pad designed for female with urinary incontinence (Poise®: Kimberly-Clark Thailand Limited, Bangkok, Thailand), which used superabsorbent material for absorption of urine in urinary incontinence patient. They are specially designed to lock away wetness better than period pad and liners. Therefore, they retain accurate amount of secretion. Each airtight plastic bag and pad was weighed by digital balance, Tanita® weighing machine: model KD-321 (Tanita Corporation of America, Inc., Illinois, USA), which has accuracy of 0.1 g. Later, the weight and identification number was labeled on the envelope. The Participants were instructed to use pads for 24 hours and change them as needed. Then, the used-pads and adhesive strips were immediately put into the plastic bag and tightly sealed. After 24 hours, the sample collection was done and all samples were packed in the envelope and sent back to researcher within seven days, by post mail. It is reported that there is no change in pad weight during a two-week storage[9]. Upon arrival of the plastic bags to the authors, the used-pads were weighed and the differences between pre- and post-weight were calculated and recorded. In case of missing or broken adhesive strip or unidentified number, the sample was excluded.

Statistical analysis

Statistical analysis was performed using SPSS software version 17. The median and the 95 percentiles value were calculated. Mann-Whitney U test was used to compare the variables between the factors such as hormonal replacement therapy, hysterectomy, menopausal status, and endometrial phase with quantities of pad weight gain. Kruskal Wallis test was used to compare the multiple variables such as types of contraceptive used, occupation, body mass index (BMI), marital status, and medical disease. The *p*-value of <0.05 was considered as statistically.

Results

Two hundred thirty seven Thai continent women were included in the present study, but 15 persons did not send the pads back to the researcher and two persons were excluded because they had menstruation during study time. Therefore, 220 participants were included. The median age of the participants was 48 years old. One hundred twenty (54.5%) participants were premenopausal and used oral contraceptive pill (OCP) in 27 cases (12.3%) or depomedroxyprogesterone acetate (DMPA) in eight cases (3.6%). One hundred cases (45.5%) were postmenopausal women, consisting of surgical menopause in 13 cases (5.9%), and hormonal replacement therapy in 14 cases (6.4%). The most participants' occupation was government officer in 78 cases (35.5%) as shown in Table 1.

The present study was done in Thailand in three different climates, i.e. rainy season (September to November 2013), winter (December 2013 to early February 2014), and summer (late in February 2014

to early May 2014). The average temperature is 25 to 33°C, 21 to 31°C, 35 to 40°C, respectively[10].

The median of pad test in 24 hours of Thai continent women was 1.8 g (95 percentiles 4.7 g) as shown in Fig. 1, and minimum to maximum pad weight gain was 0.6 to 6.6 mg. The median pad weight gain in premenopausal women was 2.15 g, which was significantly higher than in postmenopausal women (1.1g) (Table 3). The premenopausal women who were on oral contraception pills (OCP) and DMPA had median pads weight significantly higher than women with no contraception but there was no significant difference between the women with OCP and DMPA.

Table 1. Demographic data

Characteristic	All participants (n = 220)
Age (year), median (IQR)	48 (42-55)
BMI (kg/m^2), median (range)	22.86 (20.59-26.15)
Underweight (<18.5)	8 (3.6%)
Normal (18.5-24.9)	137 (62.3%)
Overweight (25-29.9)	60 (27.3%)
Obese (≥30)	15 (6.8%)
Occupation	
Business	22 (10.0%)
Employee	57 (25.9%)
Housewife	57 (25.9%)
Officer	78 (35.5%)
Agriculturist	6 (2.7%)
Status	
Single	39 (17.7%)
Married	167 (75.9%)
Windowed	14 (6.4%)
Medical disease	
No	159 (72.3%)
DLP	19 (8.6%)
DM	6 (2.7%)
HT	9 (4.1%)
Thyroid disease	13 (5.9%)
DM, HT	7 (3.2%)
DLP, DM	4 (1.8%)
DM, HT, DLP	3 (1.4%)
Hysterectomy	13 (5.9%)
Premenopausal status	120 (54.5%)
Postmenopausal status	100 (45.5%)
Contraception	
Oral contraceptive pills	27 (12.3%)
DMPA	8 (3.6%)
Hormonal replacement therapy	14 (6.4%)

IQR = interquartile range; BMI = body mass index; DLP = dyslipidemia; DM = diabetes mellitus; HT = hypertension; DMPA = depomedroxyprogesterone acetate

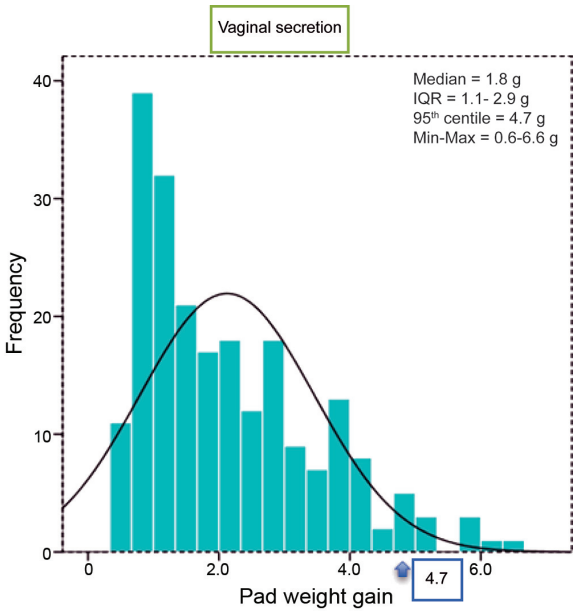

Fig. 1 Histogram of vulvo-vaginal secretion.

The comparison of two variables was calculated by Mann-Whitney U test as shown in Table 3. The authors found that the median of pad weight in premenopausal status was 2.15 g more than the median of postmenopausal status (1.1 g). Duration of postmenopause, hormonal replacement therapy status, and menopausal status were the significant variables (Table 3).

Discussion

The pad test is a simple tool to evaluate the amount of urine lost over the duration of testing, by measuring the increase in the weight of the perineal pads before and after use. It is used to diagnose, assess the severity of urinary incontinence, and follow-up after treatment[11]. Therefore, it is essential to get an accurate weight. We used a superabsorbent pad for the urine and secretion absorption to get the accurate weight. It can protect evaporation of vaginal secretion. Furthermore, the participants had to send the pads in sealed plastic bags to researcher immediately after test, by post mail, so they will be arrive to the authors within one to two weeks. There is evidence that there is no significant weight change if the pads are kept in sealed plastic bag for two weeks[9].

According to our findings, the median amount of 24-hours pad test in Thai women was 1.8 g, and the

Table 2. The variable factors which associated amount of vulvo-vaginal secretion

Variables	n	Median pad weight gain (g)	*p*-value*
Occupation			0.087
Business	22	2.1	
Employee	57	1.8	
Housewife	57	1.4	
Officer	78	1.95	
Agriculturist	6	1.45	
BMI			0.643
Underweight (<18.5)	8	1.35	
Normal (18.5-24.9)	137	1.8	
Overweight (25-29.9)	60	2.1	
Obese (≥30)	15	1.6	
Medical disease			0.629
No	159	1.7	
DLP	19	2.4	
DM	6	2.2	
HT	9	1.6	
Thyroid disease	13	1.8	
DM, HT	7	0.8	
DLP, DM	4	2.0	
DM, HT, DLP	3	1.8	
Climates			0.523
Rainy	63	1.6	
Winter	54	1.8	
Summer	103	1.8	
Contraception			<0.001*
No	185	1.6[(1),(2)]	
Contraceptive pills	27	3.7[(3)]	
DMPA	8	3.3	

* Statistical significant *p*-value <0.05

[(1)] No contraception compared with contraceptive pills $p<0.001$

[(2)] No contraception compared with DMPA $p = 0.015$

[(3)] Contraceptive pills compared with DMPA $p = 0.954$

Table 3. The variable factors which associated amount of vulvo-vaginal secretion

Variables	n	Median pad weight gain (g)	*p*-value*
Hormone replacement therapy			<0.001*
No	206	1.65	
Yes	14	3.8	
Menopausal status			<0.001*
Premenopausal	120	2.15	
Postmenopausal	100	1.1	
Hysterectomy			0.142
Yes	207	1.7	
No	13	2.8	
Period of test in menstrual cycle			0.202
Follicular phase	55	1.9	
Luteal phase	56	2.5	
Duration of postmenopausal			<0.001*
≤5 years	49	1.8	
>5 years	51	0.9	
Sexual active			0.271
Yes	61	1.8	
No	159	1.8	

* Statistical significant *p*-value <0.05

95 percentile was 4.7 g. This finding was similar to the result of a previous study in Brazil, which reported the median of 24-hours pad test of 1.9 g and the 95 percentiles of 4.4 g[(7)]. This is contrary to the study done in Australia(6) that reported the median of 0.3 g and 95 percentiles of 1.3 g. The lower pad test value may be explained by different type of pad used. They did not use the superabsorbent pad as we used in our study.

From our result, premenopausal status, hormonal contraceptive used, and postmenopausal women with hormonal replacement therapy had significantly larger amount of vaginal secretion[(12)]. This finding may be caused by estrogen, which increases vaginal secretion. Less than 5-year postmenopausal women had significantly larger amount of vaginal secretion comparing to postmenopausal women with menopause period of more than five years because vaginal atrophy usually occurred after four or five years after the menopause[(13)].

Factors that did not affect amount of vaginal secretion were BMI and occupation. Vaginal secretion was not decreased by post hysterectomy status because of only small amount of cervical discharge contribute to the total amount of vaginal secretion. Since larger amount of vaginal secretion was a transudate from vaginal vessels, it was not affected by hysterectomy. Weather had been claimed in one report in Brazil to affect amount of vaginal secretion[(11)]. However, we did not find difference in the pad test at different time of the year. One explainable reason is that the climate in Thailand has minimal change between seasons. Period of ovarian cycle has no significant effect on vaginal secretion as the estrogen that may affect vaginal secretion raises in late follicular phase then decreases just before ovulation and raises again in mid-luteal phase as a result of corpus luteal secretion. Because there are fluctuations in estrogen level throughout the

cycle, the day in the period has not affected the pad test[14]. The normal value of pad test in Thai women from our study can be used to diagnose women with mild urinary incontinence from women with high normal secretion and follow-up after treatment. It also can be used as baseline data for further study about the urinary incontinence in Thai women. In the present study, the authors did not collect 24-hour pad test in the incontinence women, so we cannot find the cutoff value between continence and incontinence. The 95 percentile is the upper limit of normal 24-hour pad test.

Conclusion

The authors found the median of 24-hour pad test (1.8 g) and cut off value at 95 percentile (4.7g) in Thai women. These normal values will be useful for evaluation and diagnosis of urinary incontinence in Thai women. If the patient complained of involuntary leakage of urine and the 24-hour pad test at more than 95 percentile, it may be incontinence in this patient. The factors that associated amount of vulvo-vaginal secretion are menopausal status, contraceptive, duration of menopause, and hormonal replacement therapy.

What is already known on this topic?

There is already the normal value of the 24- hours pad test in many Caucasian populations but not in Thai women.

What this study adds?

The study of normal value in Thai women is very important for future use as for the differential diagnostic, evaluation, monitoring of the disease, and follow-up. Different climate and race can give different normal value. Therefore, using our own, Thai data, is important for the reference database of Thai people for this test.

Potential conflicts of interest

None.

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การตรวจแผ่นรองซับ 24 ชั่วโมง ในสตรีไทยที่ไม่มีภาวะปัสสาวะเล็ดราด

เกวลิน กอบวิทยา, สุวิทย์ บุณยะเวชชีวิน

ภูมิหลัง: *การตรวจภาวะปัสสาวะเล็ดราดโดยวิธีใช้แผ่นรองซับแบบ 24 ชั่วโมง เป็นเครื่องมือที่สามารถใช้แยกภาวะปัสสาวะเล็ดราด ประเมินความรุนแรงของการมีปัสสาวะเล็ดราด และใช้ในการติดตามผลเปรียบเทียบปริมาณปัสสาวะเล็ดราดก่อนและหลังการรักษา ค่าปกติของแผ่นรองซับ 24 ชั่วโมง มีการศึกษาในกลุ่มประชากรต่างประเทศแต่ในประเทศไทยยังไม่มีการศึกษา ซึ่งข้อมูลเหล่านี้มีความสำคัญเพื่อใช้เป็นค่าพื้นฐานข้อมูลของคนไทยซึ่งมีความแตกต่างทางเชื้อชาติ สภาพแวดล้อม และสภาพภูมิอากาศ และอาจมีผลต่อค่าปกติของการตรวจแผ่นรองซับแบบ 24 ชั่วโมง*

วัตถุประสงค์: *เพื่อศึกษาน้ำหนักปกติของการตรวจแผ่นรองซับ 24 ชั่วโมง ในสตรีไทยที่ไม่มีอาการปัสสาวะเล็ดราด โดยเปรียบเทียบน้ำหนักก่อนและหลังการใส่*

วัสดุและวิธีการ: *สตรีไทยที่ไม่มีภาวะปัสสาวะเล็ดราดจากการตอบแบบสอบถาม UDI-6 เพื่อแยกภาวะปัสสาวะเล็ดราดออกไป จะได้รับคำแนะนำให้ใช้แผ่นรองซับใน 24 ชั่วโมง ตลอดระยะเวลาที่ใช้แผ่นรองซับ ผู้เข้าร่วมการศึกษาสามารถปฏิบัติกิจวัตรได้ตามปกติ แต่ให้หลีกเลี่ยงการออกกำลังกายและการมีเพศสัมพันธ์ในช่วงที่ทำการศึกษา และสามารถเปลี่ยนแผ่นรองซับได้ตามต้องการ โดยแผ่นรองซับทั้งหมดจะถูกนำใส่ในถุงพลาสติกที่ปิดสนิทและบรรจุในซองปิดผนึกส่งกลับคืนผู้นิพนธ์เร็วที่สุดไม่เกิน 2 สัปดาห์ จากนั้นผู้นิพนธ์จะทำการชั่งน้ำหนัก และคำนวณความแตกต่างของน้ำหนักก่อนและหลังใช้*

ผลการศึกษา: *ค่ามัธยฐานของน้ำหนักของการตรวจแผ่นรองซับ 24 ชั่วโมง ในสตรีไทยคือ 1.8 กรัม และค่าเปอร์เซ็นต์ไทล์ที่ 95 คือ 4.7 กรัม และปัจจัยที่พบว่ามีความสัมพันธ์กับปริมาณสารคัดหลั่งบริเวณอวัยวะสืบพันธุ์สตรีและช่องทางคลอดอย่างมีนัยสำคัญทางสถิติคือ วัยก่อนหมดประจำเดือน การได้รับฮอร์โมนบำบัดในกลุ่มวัยหมดประจำเดือน การได้ยาคุมกำเนิด และภาวะหมดประจำเดือนเป็นระยะเวลาน้อยกว่า 5 ปี*

สรุป: *จากการศึกษาพบว่าค่ามัธยฐานของน้ำหนักจากการตรวจแผ่นรองซับ 24 ชั่วโมง ในผู้หญิงไทยที่ไม่มีภาวะปัสสาวะเล็ดราดคือ 1.8 กรัม และค่าเปอร์เซ็นต์ไทล์ที่ 95 คือ 4.7 กรัม ค่าปกตินี้จะสามารถนำไปใช้ประโยชน์ในการอ้างอิงเป็นค่าพื้นฐาน รวมถึงการประเมินและวินิจฉัยเบื้องต้นในกลุ่มผู้หญิงไทยที่มีประวัติสงสัยภาวะปัสสาวะเล็ดราดต่อไป*