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A Comparison of Effectiveness of Thai Traditional Massage and Tamsulosin in Lower Urinary Tract Symptoms: A Randomized Controlled Trial

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Abstract

The prospective clinical, non-inferiority study aimed to investigate the effectiveness of Thai traditional massage on lower urinary tract symptoms (LUTS) compared with Tamsulosin in Thai men. It was conducted on men aged 50 to 75 years old with LUTS (N = 45). Participants were blocked four randomly assigned into 2 groups. The control group (n = 25) was received 0.4 mg Tamsulosin daily and the study group (n = 20) was given Thai traditional massage for 4 weeks. The efficacy evaluation was performed by the International Prostate Symptoms Score (IPSS), a Thai version of the World Health Organization Quality of Life Questionnaire (WHO-QoL Brief), Uroflowmetry, and Post-void residual urine (PVR) at baseline and end of study. The background characteristics of participants were not significantly different between groups. Both interventions relieved LUTS in the total IPSS and the quality of life score associated with urination were decreased, described as symptoms and quality of life due to urination improvement after 4 weeks of intervention. Interestingly, the Thai traditional massage has significant improvement in total IPSS and voiding score ($p < .05$). Additionally, the time to peak flow rate, peak flow rate (Qmax), average flow rate (Qave) and voided volume of both interventions were improved with no statistical significance. PVR was decreased in both interventions. The WHO-QoL brief score was improved the total score. There was no significant difference in terms of uroflowmetry, PVR, and WHO-QoL brief scores compared between groups. The result suggests that Thai traditional massage has the potential to be an alternative treatment for LUTS.

Keywords

LUTS, tamsulosin, Thai traditional massage

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Introduction

Benign prostatic hyperplasia (BPH) is one of the most common urological diseases in men worldwide.[1,2] It is distinguished by a benign overgrowth of prostatic tissue around the urethra, which eventually constricts the urethral opening, resulting in lower urinary tract symptoms (LUTS). In addition, the highest prevalence (80%) is present in men of age 71 to 80.[3–5] BPH has also been linked to various medical complications, such as a lower quality of life and higher annual healthcare costs.[6,7]

According to the report of the outpatient department of surgery (urology) from 2015 to 2017, there were over 5000 male patients diagnosed with BPH, which was the most common urology condition. As a clinical practice guidelines of LUTS including BPH, the pharmacological treatment includes α-blocker, 5α-reductase inhibitors, anticholinergics, β3-adrenoceptor agonists, phosphodiesterase-5-inhibitors, or

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their combinations. Any pharmacological therapy aims to alleviate symptoms by relaxing prostate smooth muscle, reducing prostate volume, or relaxing bladder smooth muscle. The mechanisms underlying these strategies are all closely related to the pathophysiology of LUTS.[8] Despite the high efficacy of these conventional medicines, side effects may occur during the medication such as postural hypotension, orthostatic hypotension, and retrograde ejaculation.[9] Therefore, alternative treatment seems to be a potential optional treatment to reduce the side effects of conventional treatment. Because of the pathophysiology of BPH, medication could target the relaxation of prostate smooth muscle, reduction of prostate volume, or relaxation of bladder smooth muscle, which could help reduce patients' suffering. According to previous research, increasing evidence suggests that another treatment, such as massage, could be used to improve patient symptoms.[10] Furthermore, previous study suggested that medical massage improved both symptoms and quality of life. This recovery is possibly due to increased blood circulation and lymph flow.[10] Recently, Li-Xin Guan and colleagues discovered that after 10 min of acupuncture at the Zhongji (RN3) acupoint, there was a difference in bladder neck mobility (BND) between the distance between the bladder neck and the lower margin of the pubic symphysis in the resting state and the Valsalva state.[11] In Thailand, Thai traditional medicine such as Thai massage has long been a part of Thailand's healing culture and has a potential treatment for several ailments.The Wat Pho (Temple of the Reclining Buddha) has an ancient marble inscription that is thought to describe a medical massage for LUTS.

Nevertheless, the study of massage therapy for BPH-associated LUTS is still limited. Hence, this study aims to investigate the efficacy of Thai traditional massage technique (Sen Sib massage) from the Wat Pho marble inscription compared to standard treatment using Tamsulosin in Thai men with BPH associated LUTS.[12]

Methodology

Study Design

A prospective non-inferiority randomized clinical trial study has been approved by the Human Research Ethical Committee and registered the Thai Clinical Trials Registry. The study was carried out from December 2018 to December 2020.

Participants

The sample size was calculated by the G*Power program with $\alpha = 0.05$, power = 80% with a projected dropout rate of 10%. The required sample size is 58 participants.[13] They were diagnosed with LUTS.

Inclusion criteria

1. Male patients suffering from LUTS for at least 6 months
2. Age 50 to 75 years old
3. Reveal the moderate level of symptoms (IPSS score between 8-19)
4. Urinary peak flow rate (Q_{max}) is between 5 to 15 ml/s evaluated by uroflowmetry with Post-voided volume of ≥150 ml determined by bladder scan
5. Prostate-Specific Antigen (PSA) level is ≤ 4 ng/ml
6. Blood urine nitrogen (BUN) level is 10 to 20 mg/dL
7. Creatinine level is 0.7 to 1.3 mg/dL
8. Glomerular filtration rate is > 60 ml/min.

Exclusion criteria

1. Urethral stricture and/or bladder neck disease active or recent < 3 months
2. Recurrent urinary tract infection
3. Urinary retention
4. Indication of BPH surgery or prostate surgery
5. Bladder/urethra stone
6. Acute or chronic prostatitis
7. Prostate or bladder cancer,
8. Interstitial cystitis,
9. Active upper tract stone disease-causing symptoms
10. Indication of bladder neck and pelvic region surgery
11. Local or systemic inflammation disorder
12. Orthostatic hypotension (standing SBP reduced > 20 mm Hg or DBP reduced > 10 mm Hg compared to supine position)
13. History of neurologic or psychiatric disorder/disease interfering with the detrusor or sphincter muscle
14. Insulin-dependent diabetes mellitus and non-controlled non-insulin-dependent diabetes mellitus
15. History of chronic renal insufficiency
16. History of severe hepatic failure or other severe underlying diseases

Every new case of the Urology department with LUTS would be screened by urologist following the above criteria. If they meet the criteria, they will be invited to participate in the study.

Study Intervention

After the informed consent signing was obtained, 58 eligible participants were randomly allocated to two groups using block four randomization technique: 1) Control groups (n = 29); and 2) Study group (n = 29). The control group was prescribed 0.4 mg Tamsulosin orally before bedtime every day while the study group received 30 min of Thai traditional massage twice a week for four weeks. (Figure 4)

Due to the nature of the intervention, participants and the research team delivering the intervention will not be blinded to the treatment received. Outcome measures are primarily self-reported and submitted anonymously. Those involved in the data analyses and statistics will be blinded to the group allocation.

The control group: tamsulosin treatment. The participants took 0.4 mg Tamsulosin orally before bedtime for 4 weeks.

The study group: Thai traditional massage treatment. During the study, the massage was done by a licensed Applied Thai traditional practitioner (ATTM) in a private place. Each study participant was placed in a supine position, then was coached to relax for 5 min in this position before the treatment. An abdominal massage was performed on each participant for 30 min. The massage method is followed as:

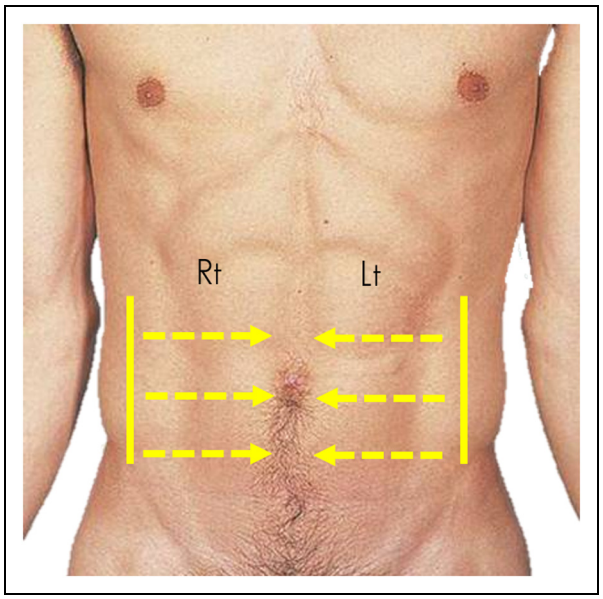

Figure 1. the location of Thai traditional massage, the line of edge of abdomen

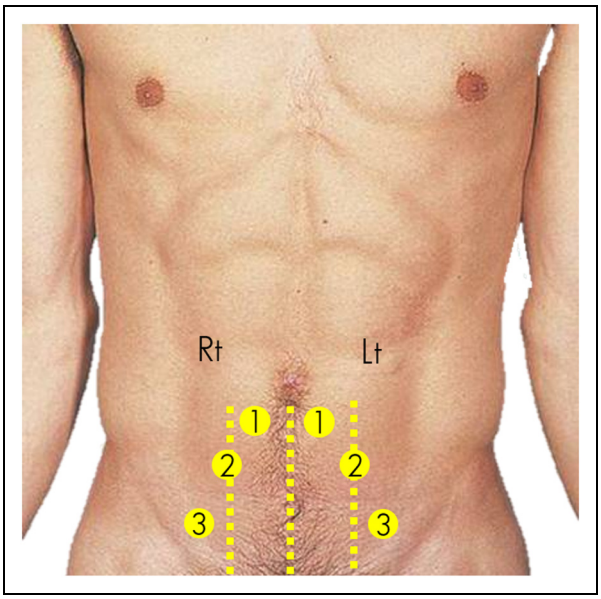

Figure 2. three pairs points of massage

Step 1: Abdominal massage started from using the base of both palms pressing on the line begun at Anterior superior iliac spines (ASIS) to costal margin at 10th rib level of each side, right and left respectively (Figure 1) for 5 min.

Step 2: The points pressed on the abdomen consisted of 3 pairs of points. The first pair of points are below the umbilicus (close to the lower edge of the navel) at medial edge of rectus abdominis muscle (Figure 2). Technique: With practitioner's thumbs, placed on both points, thumb tips pointed close together, vertically pressed both points for 45 s and rested for 15 s in a cycle, then released pressure on points and repeated the pressing and releasing cycle for total of 5 min.

The second pair of points, are below the first pair, 2 fingerbreadths below the navel, and 2 fingerbreadths lateral to the linea alba (Figure 2). Technique: Same as for first pair of points.

The third pair of points are below the second pair of points on the edge of the abdominal oblique muscle, near the inguinal groove at the edge of the abdominal oblique muscle (Figure 2). Technique: Same as for the first and second pair of points, using both upside thumbs on each point, right and left respectively.

Step 3: Technique: Pressed vertically along the linea alba line below the umbilicus, using both tips of thumbs using same 45 s pressing then releasing cycle as in Step 2 for total of 5 min (Figure 3).

Analytical Tools

The international prostate symptoms score (IPSS). The IPSS questionnaire is used to evaluate the symptoms' severity. IPSS is an 8-item questionnaire that appears to be a subjective measurement that includes 7 symptoms questions and a quality of life due to urination question (UQoL). It can be divided into three subgroups as storage symptoms (item 2, 4 and 7), voiding symptoms (item 1, 3, 5 and 6) and UQoL (item 8). The questionnaire was scored from 0 to 5, and the summation score was calculated to be between 0 and 35. A score of less than 7 indicates mild symptoms, a score of 8 to 19 indicates moderate symptoms, and a score of more than 20 indicates severe symptoms. The UQoL is defined as the lower score resulting in high quality of life due to urination (0 = well and 5 = very bad).[14] The score of each participant was summarized from symptoms daily recording that was given on recruitment day.

Thai version of world health organization quality of life questionnaire (WHO-QoL). The WHOQOL brief Thai version includes 26 items of question assessing 1 to 5 ranges of scoring. The physical results were described as good, fair, and poor, with good = 27 to 35, fair = 17 to 26, and poor = 7 to 16. The psychological domain is described as good = 23 to 30, fair = 15 to 22 and poor = 6 to 14, while the social relationship domain is described as good = 12 to 15, fair = 8 to 11 and poor = 3 to 7. The environmental domain is described as good = 30 to 40, fair = 17 to 29 and poor = 8 to 18 as well as the total score is described as good = 96 to 130, fair = 61 to 95 and poor = 20 to 60.[15]

Uroflowmetry. Uroflowmetry is used to measure the flow rate and pattern of the flow of urination. The uroflowmetry parameters are classified into 3 parts of analysis as time of urination, rate of urination and volume of urination. The time of urination is included as voiding time, flow time and time to peak flow rate, after treatment should be decreased. The rate of urination consists of peak flow rate (Qmax) and average flow rate (Qave), after treatment should be increased as well as the voided volume is also increased after treatment. Normally, the peak flow rate, or Qmax, is set to 15 ml/s. Furthermore, when the voided volume exceeds 150 mL and the PVR exceeds 100 mL, uroflowmetry parameters should be evaluated..[8,16]

Post-void residual urine (PVR). The post-voided residual urine was measured by suprapubic ultrasound or bladder scanner. The total urine remaining after urination should be less than 100 mL.[8]

Statistical Analysis

The results were analyzed by SPSS 16.0 for Windows. The findings were reported via descriptive, frequency, percentage, mean and

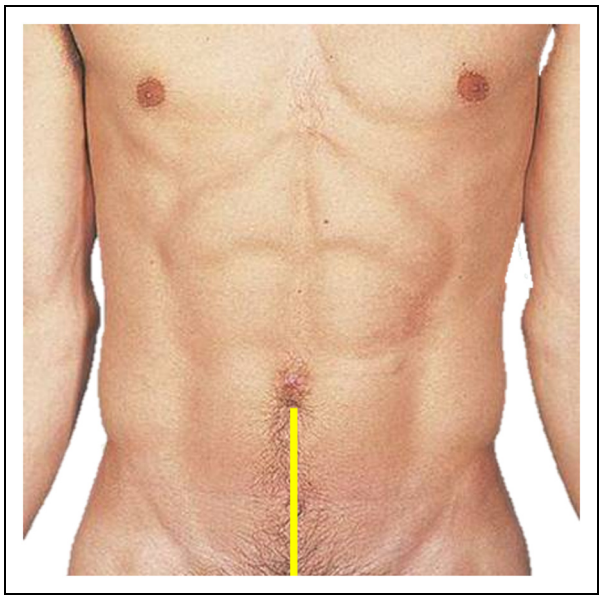

Figure 3. the middle line of abdominal massage

standard deviation. The statistical analysis was performed by using a Chi-square test to compare the background characteristics, duration of LUTS, subgroup of symptoms (storage and voiding), and comorbidity. ANOVA was applied to compare age, total IPSS score (storage and voiding), quality of life related to urinary symptoms (UQoL), uroflowmetry parameters, post-voided residual urine, PSA, BUN, Cr and GFR, baseline and end of study of the interventions. *P*-value < .05 significant level was used for all testing. Participants and the research team delivering the intervention cannot be blinded to the treatment received due to the nature of the intervention. Outcome measures are primarily self-reported and submitted anonymously. Those who were involved in the data analysis and statistics will be blinded to the group allocation.

Results

There were 58 study participants at the beginning of the trial. 45 participants completed the interventions. They were randomly assigned into 2 groups by block randomization in Figure 4. Table 1 shows that baseline characteristics of participants, such as age and laboratory investigations (PSA, BUN, Cr, and GFR), were similar.

Participants had LUTS from 6 to 36 months, mostly in 6 months. In both interventions, subgroups LUTS analysis revealed that nocturia was the most common storage symptom. The voiding symptom was shown the most frequent in slow stream of urination in both interventions, while the control group was also most frequent in incomplete emptying and intermittency in the study group. The majority of the control group was reported to have no comorbid conditions. Hypertension, on the other hand, was found to be a comorbidity in half of the study participants. Subgroup lower urinary tract (LUT) symptoms and comorbidity of all participants at baseline evaluation are shown in Table 2. When focusing on the baseline evaluation on age, laboratory investigation, duration of LUTS, frequency of subgroup LUTS and comorbidity were similar in both interventions.

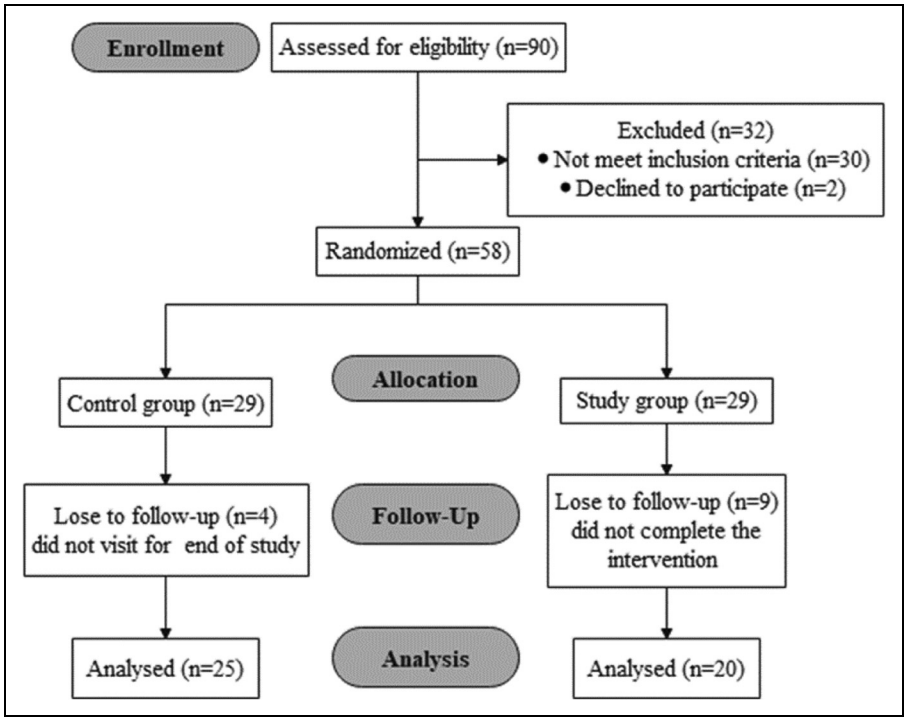

Figure 4. Study flowchart

Table 1. Baseline Characteristics of Participants.

	The control group (N = 25)	The study group (N = 20)	P-value
Age	63.20 ± 7.11	62.65 ± 7.06	.797
Laboratory			
• **PSA**	2.56 ± 1.56	3.30 ± 3.51	.347
• **BUN**	14.80 ± 2.71	14.52 ± 4.27	.786
• **Cr**	1.01 ± 0.18	1.04 ± 0.17	.608
• **GFR**	78.89 ± 19.72	70.96 ± 16.12	.161

Data was analyzed by ANOVA test.
Values are expressed in mean ± standard deviation.
Abbreviations: N = Number of patients in each group.
PSA = Prostate Specific Antigen.
BUN = Blood Urea Nitrogen.
Cr = Creatinine.
GFR = Glomerular Filtration Rate.
* = P-value <.05 is considered a statistically significant difference.

The efficacy indicators were included as IPSS, Uroflowmetry parameters, PVR, and WHO-QoL assessed at baseline and the end of study evaluations.

The IPSS evaluation suggests that both interventions can reduce the severity of LUTS. The IPSS questionnaire consists of 4 parts, namely total IPSS score (IPSS-T), storage score (IPSS-S), voiding score (IPSS-V), and quality of life due to urination (UQoL). There was decreased in all parts of the IPSS score for all subjects. Due to the IPSS questionnaire is a subjective measurement, when compared between the 2 groups, the mean IPSS-T and IPSS-V score after the massage was lower than the control group with a statistically meaningful difference ($P < .05$). According to the IPSS-T, the severity of LUTS of participants who received a massage appears to reduce from moderate to mild level (table 3). The IPSS of each group was demonstrated in table 4.

The mean of uroflowmetry parameters, there was no significant difference between the two treatments. In the study group, voiding time was a statistical reduction after treatment ($P < .05$). Flowtime and time to peak flow rate were slightly reduced after the massage session. Additionally, the peak flow rate (Qmax), average flow rate (Qave) and voided volume were negligible reductions after the massage session. In addition, Qave of the study had a significantly high positive correlation (cor > 0.767). Flow time, time to peak flow rate, and voided volume of the study had a statistically significant low positive correlation at the start and end of the study. However, all the changes did not reach statistical significance when compared between the 2 groups. (Table 4)

PVR (Table 4) exhibited a reduction of urine retention in both groups. When compared PVR between the 2 groups, there was no significant difference.

When focusing on the quality of life of the participants, the mean WHO-QoL total score was increased in both groups with an increase from baseline in the control and the study groups, respectively. The total score, which represents overall quality of life, showed that both interventions remained at a fair level when compared to the baseline and end of the study. The physical score (D1) decreased in the control group and increased in the study group. For psychological score (D2), there was an improvement in both groups. The score of social relationship (D3) was increased in the study group, but decreased in the study group. It meant that the social relationship improved only in the control group. For environment (D4), the mean score was increased in the control group and decreased in the study group. Nonetheless, no statistically significant difference between the two groups was found in all domains. Physical, psychological, social relationship and environmental domains of the control group remained at a good level. On the contrary, the study group had a fair level of acceptance in the psychological domain. The changes in WHO-QoL score from baseline to the end of the study were shown in Table 4.

Discussion

The results suggested the improvement of LUTS severity after massage session shown the LUTS severity detected by IPSS, peak flow rate (Qmax) and PVR improvement. It may have the same effect as the 0.4 mg Tamsulosin oral daily, a super selective α_1-adrenergic receptor antagonist, relieving the symptoms via decreases smooth muscle tone in the prostate, urethra, and bladder neck, resulting in reducing urinary flow resistance.[17] It may suppose that abdominal massage is a mechanical pressure on the muscle may induce parasympathetic activity which results in several signs such as heart rate, blood pressure and heart rate variability as well as hormonal levels. For instance, cortisol levels following a massage session tend to increase, leading to a relaxation response.[18] When performing a massage on the abdomen, it could stimulate the smooth muscle to stretch. The abdominal massage results in increased visceral smooth muscle stretching and tension as well as intravesical pressure on the bladder wall and urethra.[19] Yoshimura *et al.* Fowler *et al.* and de Groat *et al.* explain that the afferent signal sent to the spinal cord via pelvic nerve resulting in detrusor muscle relaxation and also activates pudendal nerve resulting in external urethral sphincter contraction. It is called "Guard reflex or Urethral reflex".[20–22] Furthermore, the massage may activate the parasympathetic nervous system via the spinobulbospinal reflex pathway, inhibit the sympathetic nervous system via hypogastric nerve, and activate pudendal and pelvic nerve, which result in urethral sphincter relaxation and bladder contraction.[21] The abdominal massage may sent a signal to the parasympathetic nervous system by the visceral afferent fiber, resulting in bladder and urethral contraction. It was assumed that abdominal massage in these locations may contribute to the stronger bladder and urethra.[23] Interestingly, increasing bladder volume will raise the potential bladder power, notably in the range from empty up to 150 to 250 mL.

Table 2. Duration of LUTS, Frequency of Subgroup LUT Symptoms and Comorbidity of Baseline Evaluation.

	The control group (N = 25)	The study group (N = 20)	P-value
	N (%)	N (%)	
Duration of LUTS			
6 months	14 (56.0)	8 (40.0)	.387
9 months	1 (4.0)	1 (5.0)	
12 months	3 (12.0)	6 (30.0)	
24 months	7 (28.0)	4 (20.0)	
36 months	0 (0.0)	1 (5.0)	
Storage LUTS			
Urgency	10 (40.0)	11 (55.0)	.316
Increased daytime frequency	19 (76.0)	14 (70.0)	.651
Nocturia	21 (84.0)	19 (95.0)	.243
Urinary incontinence	12 (48.0)	8 (40.0)	.592
Voiding LUTS			
Slow stream	18 (72.0)	13 (65.0)	.614
Intermittency	12 (48.0)	13 (65.0)	.254
Hesitancy	9 (36.0)	8 (40.0)	.783
Straining	15 (60.0)	12 (60.0)	1.000
Post-void dribbling	3 (12.0)	4 (20.0)	.416
Dysuria	6 (24.0)	4 (20.0)	.694
Incomplete emptying	18 (72.0)	9 (45.0)	.066
Comorbidity			
None	10 (40.0)	6 (30.0)	.544
Hypertension	9 (36.0)	10 (50.0)	.379
Diabetes Miletus	5 (20.0)	6 (30.0)	.500
Dyslipidemia	7 (28.0)	6 (30.0)	1.000
Heart disease	3 (12.0)	0 (0.0)	.242
Liver disease	0 (0.0)	3 (15.0)	.080
Allergy	1 (4.0)	1 (5.0)	1.000
Parkinson's disease	0 (0.0)	1 (5.0)	.455
Gastritis	1 (4.0)	1 (5.0)	1.000
Cerebrovascular	0 (0.0)	1 (5.0)	.444
Inguinal hernia	0 (0.0)	1 (5.0)	.444
Anxiety	1 (4.0)	0 (0.0)	1.000

Data was analyzed by Chi^2 test, LUT = Lower Urinary Tract Symptoms.
* = P-value <0.05 is considered a statistically significant difference.

At volumes higher than 400 to 500 mL, the detrusor may become overstretched and contractile strength may decrease.[24] So, the massage may increase the bladder power because after massage the PVR was reduced. The results of this study suggest that the Thai traditional abdominal massage may activate urethral reflex, leading to increased bladder storage capacity and reduced urination frequency leading the reducing LUTS severity, increasing the peak flow rate and reducing the PVR. According to the anatomy, the Thai traditional massage was performed on the lower abdomen, with muscles such as the external oblique, internal oblique, transversus abdominis, rectus abdominis, and pyramidalis involved. All of the mentioned muscles cover the urinary organs.[23] In both Weerapong *et al.*[18] and Kassolik *et al.*[10] studies suggested the effects of massage on muscle, deep massage (such as lifting, kneading, pressing or rolling tissue, as increasing blood circulation and normalizing the muscle tension within the abdominal cavity, leading to internal organ function improvement. Recently, the study of Boonruab J. and colleagues on effect of court-type Thai traditional massage vs senokot treatment on chronic constipation: a randomized controlled trial. They use an abdominal massage had to improve the chronic constipation, which had the same points of treatment as anterior superior iliac spine as the location of the inguinal ligament, psoas major muscle, iliacus muscle like the ours study. the abdominal massage improved the chronic constipation by increasing

Table 3. the Severity of LUTS from Baseline to end of Treatments.

	The control group (N = 25)		The study group (N = 20)	
	N (%)		N (%)	
Severity of LUTS (Scores)	Baseline	End of study	Baseline	End of study
• Mild (0-7)	0.0 (0.0)	9.0 (36.0)	0.0 (0.0)	15.0 (75.0)
• Moderate (8-19)	25.0 (100.0)	12.0 (48.0)	20.0 (100.0)	5 (25.0)
• Severe (20-35)	0.0 (0.0)	4.0 (48.0)	0.0 (0.0)	0.0 (0.0)

Table 4. Changes from Baseline to end of Treatments in IPSS, Uroflowmetry Parameters, PVR, and WHO-QoL.

	The control group (N = 25)		The study group (N = 20)		
Parameters	Baseline	End of study	Baseline	End of study	P-value
IPSS					
Total score	14.40 ± 4.70	11.48 ± 6.32	14.45 ± 3.33	6.90 ± 2.43	.004*
• Storage (24,7)	7.76 ± 2.33	6.44 ± 2.90	7.10 ± 2.34	5.35 ± 1.53	.137
• Voiding (1,3,5,6)	6.64 ± 4.19	5.08 ± 5.04	7.35 ± 3.75	1.55 ± 1.96	.005*
UQoL	3.44 ± 0.65	2.48 ± 1.42	3.80 ± 0.95	2.05 ± 0.76	.228
Uroflowmetry					
• Voiding time	47.79 ± 20.69	50.17 ± 24.19	68.47 ± 3.26	50.02 ± 18.89	.982
• Flowtime	40.66 ± 20.35	41.11 ± 20.54	53.75 ± 23.01	46.17 ± 16.35	.375
• Time to peak flow rate	14.39 ± 14.92	10.90 ± 7.90	14.25 ± 12.95	9.64 ± 6.67	.572
• Peak flow rate (Qmax) (15 mL/s)	9.65 ± 2.66	10.53 ± 4.66	10.33 ± 4.29	11.76 ± 5.61	.427
• Average flow rate (Qave)	5.07 ± 1.68	5.52 ± 2.35	5.37 ± 2.53	6.05 ± 3.16	.523
• Voided volume (>150 mL.)	203.83 ± 102.05	222.73 ± 129.93	257.66 ± 110.43	260.66 ± 138.85	.351
PVR (>100 mL.)	77.68 ± 86.06	61.72 ± 83.40	88.90 ± 130.76	83.30 ± 116.81	.474
WHO-QoL					
• Total score	90.24 ± 9.24	91.40 ± 8.25	85.90 ± 14.39	86.75 ± 14.18	.176
• Physical (D1)	28.44 ± 12.93	28.28 ± 13.03	23.75 ± 4.88	25.45 ± 4.37	.358
• Psychological (D2)	25.84 ± 13.37	26.44 ± 13.26	22.80 ± 3.52	23.00 ± 4.18	.271
• Social relationship (D3)	13.76 ± 16.03	14.24 ± 15.24	10.40 ± 1.85	10.25 ± 2.15	.253
• Environment (D4)	32.80 ± 12.31	33.04 ± 11.77	28.95 ± 4.83	27.95 ± 5.63	.083

Data was analyzed by ANOVA test.
Values are expressed in mean ± standard deviation.
Abbreviations: N = Number of patients in each group.
IPSS = International Prostate Symptom Score.
PVR = Post-voided residual urine volume.
WHO-QoL = World Health Organization Quality of Life.
* = P-value <.05 is considered a statistically significant difference.

frequency of defecations and sensation of complete evacuation suggested that abdominal massage leading to abdominal cavity pressure change by the relaxation of muscles and ligaments which affect and control abdominal pressure and also affect colon movement, which is the main factor in the defecation process.[25] The lower urinary tract relaxation and increase bladder power after massage session may the major role of LUTS improvement. The adverse event of the massage was not found in the medical records of participants in a Thai traditional massage group. Besides, it was noted that the uroflowmetry result and PVR were significantly altered by patients' cooperation and emotions.[16] Interestingly, Thai traditional massage on the abdomen reduced the severity of LUTS from moderate to mild at the end of the study. Consuming a lot of sugary foods in the daily lives of participants with diabetic comorbidity may affect the frequency of daytime urination and nocturia. In future, studies should be evaluated every 2 weeks and study on the large sample size and combination between the standard treatments. Moreover, the future study should be evaluated on the biomarker relating to LUTS to confirm the symptoms improvement.

Conclusion

Finally, Thai traditional massage appears to be as effective as Tamsulosin in treating LUTS. Thai traditional massage reduces symptom severity from moderate to mild. As a result, Thai traditional massage could be considered as a therapeutic option for LUTS.

Author Contributions

Study conception and design: Sinsomboon, Noppakulsatit, Tassanarong, Tungsukruthai and Sriyakul
Acquisition of data: Sinsomboon, Noppakulsatit and Sriyakul
Analysis and interpretation of data: Sinsomboon, Noppakulsatit, Tassanarong, Tungsukruthai and Sriyakul
Drafting of manuscript: Sinsomboon, and Sriyakul
Critical revision: Sinsomboon, and Sriyakul

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Ethical Approval

This study had been approved by the Human Research Ethical Committee No.1 of faculty of medicine, Thammasat University before data collection (MTU-EC-OO-4-068/61) and registered the Thai Clinical Trials Registry (No. TCTR20190204001.

Declaration of Conflicting Interests

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