Original Article

Efficacy of Yun-type pelvic floor optimal training therapy and PFMT on middle aged women with mild to moderate overactive bladder: a randomized controlled trial

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Background: The symptoms of overactive bladder (OAB) are highly bothersome to patients. In behavioral therapy, traditional pelvic floor muscle training (PFMT) can be boring and monotonous, which can cause poor compliance. It's important to establish a new safe and effective crotch-pelvic floor functional reconstruction training method [Yun-type pelvic floor optimal training (Yun-type training)] for OAB patients.

Methods: This randomized, double-blind, crossover trial recruited a total of 150 women with mild to moderate OAB. Patients were randomly assigned to receive Yun-type training (n=83) or PFMT (n=67). The intervention group was first given Yun-type training for 6 weeks, then switched to PFMT for 6 weeks after 2 weeks of elution. Patients in the control group were first treated with PFMT for 6 weeks, and changed to the use of Yun-type training for 6 weeks after 2 weeks of elution. The primary endpoint was overactive bladder symptom scores (OABSS) after 6 and 14 weeks of Yun-type training and PFMT.

Results: Yun-type training could significantly improve OABSS compared with PFMT after 6 and 14 weeks ($P<0.001$). Yun-type training was associated with an improvement in urine, urgency, urge urinary incontinence (UUI), urogenital distress inventory-6 (UDI-6), patient's perception of bladder condition (PPBC), voiding volume (VV), incontinence impact questionnaire-7 (IIQ-7), female sexual function index (FSFI), sexual desire, arousal, pain, satisfaction, pelvic floor muscle tone, type I muscle strength, type II muscle strength, and sex partner satisfaction as compared with PFMT after 6 and 14 weeks. Moreover, nocturia, maximum flow rate (Q_{max}), and climax in the Yun-type training group were significantly improved after 6 weeks, and the average flow rate (Q_{ave}) was improved after 14 weeks in the Yun-type training group.

Conclusions: Yun-type training could yield additional benefits on OAB symptoms, sexual function, and sex partner satisfaction as compared with PFMT. The superior sexual function resulting from Yun-type training can be explained by the fact that it can contract deep and superficial muscle layers, resulting in increased vaginal wall pressure and blood flow, which further improves FSFI and sex partner satisfaction. It could lead to a new non-invasive treatment for OAB patients.

Trial Registration: Chinese Clinical Trial Registry ChiCTR-INR-17012192.

Keywords: Yun-type pelvic floor optimal training therapy; pelvic floor muscle training (PFMT); mild to moderate overactive bladder

Submitted Jul 23, 2021. Accepted for publication Jul 18, 2022.
doi: 10.21037/atm-22-3357
View this article at: https://dx.doi.org/10.21037/atm-22-3357

Introduction

Overactive bladder (OAB) is a symptom syndrome of urinary urgency, and presents as urinary frequency and nocturia without infection or other pathological features, irrespective of urgency incontinence status (1,2). Nowadays, the prevalence of OAB ranges from 12–22% in Europe and 16–17% in the USA, and can vary by age, survey methodology, and diagnosis definition (3-5). Although the prevalence of OAB is similar in men and women, the prevalence of various symptoms within the OAB complex in men and women differ, owing to anatomical and physiological differences in the lower urinary tract (6,7). The symptoms of OAB are highly bothersome to patients and have an adverse impact on sleep, mental health, work productivity, and quality of life (8-10). At present, the first-line treatment approach for OAB is conservative, as recommended by the International Continence Society and the American Urology Association. The strategies of the conservative approach for OAB patients are determined by individual necessities and symptom characteristics in clinical practice (11,12). Pelvic floor muscle training (PFMT), through voluntary contraction of the muscles to shut the urethra and thereby raise urethral pressure, can inhibit the urinary reflex, control urgency, and prevent the loss of urine during detrusor contraction (13). However, PFMT can be boring and monotonous, which can cause poor compliance and modest improvement of OAB symptoms (14). Therefore, it is of great significance to establish a new safe and effective training method for functional reconstruction of pelvic floor for patients with OAB. To find a safe, effective, low follow-up rate and well tolerated new training of crotch and pelvic floor function reconstruction has become a new direction of our professional exploration. This study integrates professional and scientific pelvic floor muscle training into dance and aerobics. This method is optimized and supplemented on the basis of Yun-type training with completely independent intellectual property rights (Huzuo-2016-A-00627419), which has been mature applied in clinical practice. In this randomized, crossover trial, we reported the treatment effectiveness of Yun-type training versus PFMT for middle-aged women with mild to moderate OAB. We present the following article in accordance with the CONSORT reporting checklist (available at https://atm.amegroups.com/article/view/10.21037/atm-22-3357/rc).

Methods

Trial design and oversight

This study was a randomized, crossover, single-center clinical trial. Patients at Shanghai Fifth People's Hospital of Fudan University were included and randomization was performed for group assignment. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The protocol of this study was approved by the ethics committee of Shanghai Fifth People's Hospital of Fudan University [No. (2018)Lunshen174]. Signed informed consent forms were obtained from all included patients.

Trial population

A total of 150 middle-aged women with mild to moderate OAB from Shanghai Fifth People's Hospital of Fudan University were included in this study. Patients were included if they met the following inclusion criteria: (I) married women aged 30–45 years, irrespective of fertility status; (II) urination diary could be completed for 3 days, irrespective of urge urinary incontinence status, the number of urinations ≥8 times within 24 hours, ≥2 times in a night, and the volume of urination <200 mL/time; (III) the overactive symptom bladder scores (OABSS) ranged from 3–11, and the score of urgency of urination ≥2; (IV) female sexual function index (FSFI) <25; (V) fixed partner; (VI) sex partners did not have male sexual dysfunction; (VII) the duration of disease >3 months; and (VIII) patients did not receive drugs within 3 months. The exclusion criteria of this study were as follows: (I) asexual experience, gynecological inflammation, at lactation or menopause, presence of tumor, and endocrine disease, pelvic floor organ prolapse; (II) stress urinary incontinence or stress urinary incontinence dominant mixed urinary incontinence; (III) urinary infection or chronic inflammation; (IV) history of transurethral and pelvic surgery; (V) patients with diabetes, severe constipation, and dyspepsia; (VI) post-voiding residual (PVR) >50 mL; (VII) The patient has used M3 blockers or other OAB drugs; (VIII) patients could not adhere to Yun-type training or PFMT, and the follow-up data were unavailable.

Randomization and study agents

Eligible patients were randomly assigned to treatment with

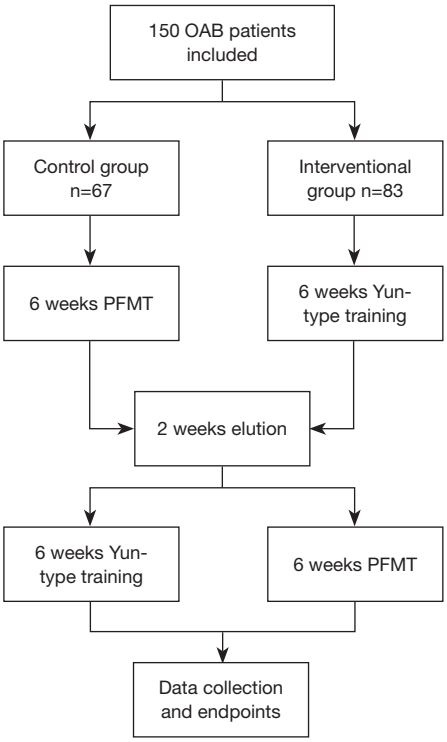

Figure 1 Flow chart of research scheme. OAB, overactive bladder; PFMT, pelvic floor muscle training.

Yun-type training or PFMT. Randomization was carried out through a central computerized system using a random number table. This study was designed as a randomized, crossover clinical trial. The intervention group was first given Yun-type training for 6 weeks, then switched to PFMT for 6 weeks after 2 weeks of elution. Patients in the control group were first treated with PFMT for 6 weeks, and changed to the use of Yun-type training for 6 weeks after 2 weeks of elution. Details regarding the Yun-type training are as follows: A 488 double metal waist chain weighing 0.8+0.1 kg is worn on the waist and hips. The class includes a 15-minute crotch warm-up. Do it for 25 minutes in a state of contracting the anus and vagina (the time and rhythm of contracting the anus and vagina is performed according to the order of the head coach). For the last 15 minutes, pelvic floor muscle strengthening and body relaxation exercises are performed with soothing music and legs slightly apart. Slow frequency (30 seconds of anal and vaginal contractions, 10 seconds of relaxation on exhalation) and fast frequency (2 seconds of anal and vaginal contractions, and relaxation on exhalation) separated by 45 reps per session.

Data collection and endpoints

The outcomes were collected and analyzed in a blinded manner by investigators. The following items were collected before treatment, after 6 weeks, and after 14 weeks of interventions: OABSS, urine in daytime, nocturia, urgency, urge urinary incontinence, patient's perception of bladder condition (PPBC), voiding volume (VV), urogenital distress inventory-6 (UDI-6), average flow rate (Q_{ave}), maximum flow rate (Q_{max}), PVR, incontinence impact questionnaire-7 (IIQ-7), C-reactive protein (CRP), FSFI, sexual desire, arousal, damp, climax, pain, satisfaction, pelvic floor muscle tone, type I muscle strength, type II muscle strength, and sex partner satisfaction.

Statistical analysis

Firstly, the normality and homogeneity of variance of the collected data were assessed. Subsequently, the mean and standard deviation were applied to describe data which met the normal distribution, otherwise, the median (interquartile range) was employed. Categorical data are presented as number of events and proportion. The characteristics between the intervention and control groups were assessed by using the *t* test or rank sum test according to the data distribution. Then, repeated measures analysis of variance (ANOVA) was applied to analyze the changes in investigated indexes between the intervention and control groups at different observation times after applying age and BMI as covariables. All reported inspection levels were 2-sided, and a P value of <0.05 was considered as statistically significant. The IBM Statistical Package for the Social Sciences (SPSS) software for Windows version 19.0 was applied to conduct all analyses in this study.

Results

Patients

In the period from December 2018 to July 2020, a total of 150 middle-aged women with mild to moderate OAB underwent randomization to Yun-type training (n=83) or PFMT (n=67) (*Figure 1*). *Table 1* summarizes the baseline characteristics of the included patients, and most variables were well matched between groups. We noted that BMI (P<0.001), PPBC (P=0.048), damp level (P<0.001), and sex partner satisfaction (P=0.012) showed significant differences between the intervention and control groups. However,

Table 1 Include the baseline characteristics of the patient

Variable	Control (n=67)	Intervention (n=83)	P value
Age (years)	37.00 (33.00, 42.00)	37.00 (32.00, 42.00)	0.914
BMI (kg/m^2)	38.00 (34.00, 42.00)	30.20 (29.10, 31.90)	<0.001
OABSS	6.00 (4.00, 8.00)	5.00 (4.00, 7.00)	0.627
Urine in daytime			0.882
0	24 (35.82)	27 (32.53)	
1	32 (47.76)	43 (51.81)	
2	11 (16.42)	13 (15.66)	
Nocturia			0.615
0	9 (13.43)	13 (15.66)	
1	29 (43.28)	38 (45.78)	
2	23 (34.33)	21 (25.30)	
3	6 (8.96)	11 (13.25)	
Urgency			0.420
2	31 (46.27)	49 (59.04)	
3	23 (34.33)	21 (25.30)	
4	12 (17.91)	11 (13.25)	
5	1 (1.49)	2 (2.41)	
UUI			0.411
0	20 (29.85)	19 (22.89)	
1	22 (32.84)	37 (44.58)	
2	18 (26.87)	22 (26.51)	
3	7 (10.45)	5 (6.02)	
PPBC			0.048
2	0 (0.00)	8 (9.64)	
3	12 (17.91)	15 (18.07)	
4	30 (44.78)	27 (32.53)	
5	25 (37.31)	33 (39.76)	
IIQ-7	50.00 (45.00, 60.00)	55.00 (45.00, 60.00)	0.834
UDI-6	40.00 (35.00, 50.00)	35.00 (30.00, 50.00)	0.124
Q_{ave}	10.00 (9.00, 10.00)	10.00 (8.00, 12.00)	0.913
Q_{max}	20.00 (17.00, 21.00)	21.00 (18.00, 23.00)	0.054
VV	215.00 (200.00, 225.00)	210.00 (180.00, 250.00)	0.646
PVR	14.00 (8.00, 20.00)	12.00 (8.00, 20.00)	0.698
CRP	2.10 (1.80, 3.60)	3.00 (1.40, 4.10)	0.875
FSFI	23.00 (21.40, 24.20)	22.00 (20.20, 23.40)	0.061

Table 1 *(continued)*

Table 1 *(continued)*

Variable	Control (n=67)	Intervention (n=83)	P value
Sexual desire	3.60 (3.60, 4.20)	4.00 (2.80, 4.00)	0.106
Arousal	4.20 (3.60, 4.20)	3.80 (3.20, 4.40)	0.332
Damp	3.60 (3.00, 4.20)	3.00 (2.40, 4.00)	<0.001
Pain	4.00 (3.60, 4.40)	4.00 (3.60, 4.40)	0.798
Climax	3.60 (2.80, 3.60)	3.20 (2.80, 3.60)	0.881
Satisfaction	3.80 (3.60, 4.40)	4.20 (3.40, 4.20)	0.490
Type I muscle strength	20.80 (19.10, 22.40)	20.90 (18.20, 24.30)	0.654
Type II muscle strength	25.30 (24.10, 26.50)	25.50 (23.20, 28.10)	0.391
Pelvic floor muscle tone	9.70 (8.00, 10.60)	8.90 (7.10, 11.40)	0.578
Sex partner satisfaction	4.00 (3.00, 6.00)	3.00 (3.00, 4.00)	0.012

Data are shown as n (%) or median (interquartile range). OABSS, overactive bladder symptoms; UUI, urge urinary incontinence; VV, voiding volume; UDI-6, urogenital distress inventory-6; PPBC, patient's perception of bladder condition; IIQ-7, incontinence impact questionnaire-7; Qave, average flow rate; CRP, C-reactive protein; Qmax, maximum flow rate; PVR, postvoid residual urine volume; FSFI, female sexual function index.

there were no significant differences between groups in terms of age, OABSS, urine, nocturia, urgency, UUI, UDI-6, IIQ-7, VV, Q_{ave}, Q_{max}, PVR, CRP, FSFI, sexual desire, arousal, climax, pain, satisfaction, type I muscle strength, type II muscle strength, and pelvic floor muscle tone.

Investigated outcomes

In *Table 2*, patients in the intervention group showed significant improvements in OABSS (P<31 0.001), urine (P<0.001), nocturia (P<0.001), urgency (P<0.001), UUI (P<0.001), PPBC (P<0.001), UDI-6 (P<0.001), IIQ-7 (P<0.001), VV (P<0.001), Q_{max} (P < 0.001), FSFI (P<0.001), sexual desire (P<0.001), arousal (P<0.001), climax (P<0.001), pain (P=0.017), satisfaction (P<0.001), type I muscle strength (P<0.001), type II muscle strength (P<0.001), pelvic floor muscle tone (P<0.001), and sex partner satisfaction (P<0.001) after 6 weeks follow-up compared with those in the control group. After 2 weeks of elution, we noted that Yun-type training resulted in significant improvements in OABSS (P<0.001), urine (P<0.001), urgency (P<0.001), UUI (P<0.001), PPBC (P<0.001), UDI-6 (P<0.001), IIQ-7 (P<0.001), VV (P<0.001), Q_{ave} (P=0.003), FSFI (P<0.001), sexual desire (P<0.001), arousal (P<0.001), pain (P<0.001), satisfaction (P<0.001), type I muscle strength (P<0.001), type II muscle strength (P<0.001), pelvic floor muscle tone (P<0.001), and sex partner satisfaction (P<0.001) after 14 weeks follow-up compared with the PFMT group. However, there were no significant differences between Yun-type training and PFMT in terms of the levels of PVR, CRP, and damp.

Discussion

Currently, PFMT is already regarded as the first choice for the prevention and treatment of OAB by the International Urine Control Association, while patient compliance is relatively poor owing to the boring and monotonous nature of PFMT. On the basis of original PFMT, the current study compared the effectiveness of Yun-type training with PFMT on OAB symptoms, sexual function, and sex partner satisfaction for middle-aged women with mild to moderate OAB. This study found that Yun-type training was significantly associated with improvements in OABSS, urine, urgency, UUI, PPBC, UDI-6, IIQ-7, VV, FSFI, sexual desire, arousal, pain, satisfaction, pelvic floor muscle tone, type I muscle strength, type II muscle strength, and sex partner satisfaction compared with PFMT. Moreover, Yun-type training could significantly improve nocturia, Q_{max}, and climax for middle-aged women with mild to moderate OAB. PFMT could inhibit the training of the pelvic floor reflex and cause detrusor contraction (13). PFMT

Table 2 Comparison of the treatment effects between the intervention and control groups

Variables	Groups	Baseline	6 weeks	14 weeks	P value		
					Time	Group	Time × group
OABSS	Control	6.12 (2.64)	4.49 (2.22)	1.87 (1.38)	0.815	0.469	<0.001
	Intervention	5.95 (2.52)	2.13 (1.49)	4.18 (1.62)			
	P value	0.693	<0.001	<0.001			
Urine	Control	0.81 (0.70)	0.67 (0.56)	0.18 (0.39)	0.699	0.425	<0.001
	Intervention	0.83 (0.68)	0.36 (0.48)	0.77 (0.61)			
	P value	0.823	<0.001	<0.001			
Nocturia	Control	1.39 (0.83)	1.36 (0.81)	0.79 (0.59)	0.984	0.177	<0.001
	Intervention	1.36 (0.90)	0.61 (0.64)	0.82 (0.57)			
	P value	0.853	<0.001	0.766			
Urgency	Control	2.75 (0.80)	1.70 (0.67)	0.69 (0.58)	0.641	0.248	<0.001
	Intervention	2.59 (0.81)	0.86 (0.84)	1.78 (0.72)			
	P value	0.242	<0.001	<0.001			
UUI	Control	1.18 (0.98)	0.76 (0.76)	0.21 (0.41)	0.788	0.107	<0.001
	Intervention	1.16 (0.85)	0.30 (0.49)	0.81 (0.71)			
	P value	0.881	<0.001	<0.001			
PPBC	Control	4.19 (0.72)	3.19 (0.74)	1.79 (0.75)	0.125	0.846	<0.001
	Intervention	4.02 (0.99)	2.10 (0.55)	3.08 (0.57)			
	P value	0.241	<0.001	<0.001			
UDI-6	Control	41.19 (8.79)	26.37 (10.35)	14.45 (7.95)	0.236	0.153	<0.001
	Intervention	39.17 (9.38)	16.51 (7.99)	20.51 (7.99)			
	P value	0.179	<0.001	<0.001			
IIQ-7	Control	52.13 (9.41)	37.13 (9.41)	17.51 (8.75)	<0.001	0.936	<0.001
	Intervention	52.90 (10.90)	17.90 (10.90)	32.90 (10.90)			
	P value	0.649	<0.001	<0.001			
VV	Control	214.25 (23.36)	223.51 (22.98)	276.49 (33.97)	0.644	0.663	<0.001
	Intervention	213.19 (41.65)	275.90 (37.60)	235.90 (37.60)			
	P value	0.853	<0.001	<0.001			
Q_{ave}	Control	9.82 (1.36)	10.54 (1.76)	11.24 (1.97)	0.525	0.284	0.056
	Intervention	10.13 (2.18)	10.43 (2.51)	10.17 (2.32)			
	P value	0.309	0.776	0.003			
Q_{max}	Control	19.78 (2.88)	21.43 (3.88)	21.60 (3.16)	0.203	<0.001	<0.001
	Intervention	20.36 (3.63)	26.57 (2.87)	25.57 (2.82)			
	P value	0.284	<0.001	<0.001			
PVR	Control	14.43 (8.71)	14.81 (7.50)	14.79 (7.62)	0.54	0.297	0.397
	Intervention	14.00 (8.19)	13.78 (6.38)	15.46 (6.32)			
	P value	0.755	0.368	0.559			

Table 2 *(continued)*

Table 2 *(continued)*

Variables	Groups	Baseline	6 weeks	14 weeks	P value		
					Time	Group	Time × group
CRP	Control	2.77 (1.53)	2.68 (1.45)	2.72 (1.34)	0.544	0.67	0.404
	Intervention	2.79 (1.52)	2.80 (1.51)	2.82 (2.28)			
	P value	0.938	0.624	0.749			
FSFI	Control	22.56 (1.85)	25.27 (1.85)	29.38 (1.49)	<0.001	0.007	<0.001
	Intervention	21.88 (2.33)	28.24 (2.34)	24.89 (2.27)			
	P value	0.053	<0.001	<0.001			
Sexual desire	Control	3.75 (0.44)	4.37 (0.79)	5.43 (0.45)	0.042	<0.001	<0.001
	Intervention	3.56 (0.80)	5.36 (0.72)	3.20 (0.82)			
	P value	0.087	<0.001	<0.001			
Arousal	Control	3.87 (0.62)	4.54 (0.62)	5.57 (0.67)	<0.001	0.179	<0.001
	Intervention	3.81 (0.98)	5.27 (0.87)	4.86 (0.87)			
	P value	0.625	<0.001	<0.001			
Damp	Control	3.70 (0.62)	4.01 (0.71)	3.97 (0.68)	0.246	0.017	0.164
	Intervention	3.28 (0.75)	3.87 (0.70)	3.77 (0.66)			
	P value	<0.001	0.205	0.071			
Climax	Control	3.35 (0.58)	3.69 (0.53)	4.23 (0.60)	0.557	0.107	<0.001
	Intervention	3.24 (0.56)	4.22 (0.65)	4.13 (0.58)			
	P value	0.258	<0.001	0.299			
Pain	Control	3.97 (0.57)	4.16 (0.53)	4.72 (0.63)	0.327	0.14	<0.001
	Intervention	4.02 (0.45)	4.35 (0.42)	4.26 (0.46)			
	P value	0.559	0.017	<0.001			
Satisfaction	Control	3.92 (0.65)	4.49 (0.50)	5.46 (0.31)	0.244	0.798	<0.001
	Intervention	3.98 (0.53)	5.16 (0.39)	4.67 (0.38)			
	P value	0.557	<0.001	<0.001			
Type I muscle strength	Control	20.84 (1.93)	23.07 (1.81)	31.91 (1.85)	<0.001	0.047	<0.001
	Intervention	21.38 (3.40)	29.30 (3.13)	23.48 (3.40)			
	P value	0.248	<0.001	<0.001			
Type II muscle strength	Control	25.28 (1.80)	28.94 (1.78)	37.04 (1.76)	<0.001	0.834	<0.001
	Intervention	25.70 (3.41)	34.57 (3.22)	29.60 (3.41)			
	P value	0.367	<0.001	<0.001			
Pelvic floor muscle tone	Control	9.40 (2.14)	6.68 (1.82)	4.16 (1.56)	<0.001	0.751	<0.001
	Intervention	9.10 (2.38)	4.75 (1.39)	6.42 (2.10)			
	P value	0.418	<0.001	<0.001			
Sex partner satisfaction	Control	4.07 (1.68)	5.72 (1.71)	7.46 (1.02)	0.086	0.011	<0.001
	Intervention	3.24 (0.92)	7.10 (0.95)	5.76 (1.63)			
	P value	<0.001	<0.001	<0.001			

Data are shown as mean (SD). OABSS, overactive bladder symptoms; UUI, urge urinary incontinence; VV, voiding volume; PPBC, patient's perception of bladder condition; IIQ-7, incontinence impact questionnaire-7; UDI-6, urogenital distress inventory-6; Qave, average flow rate; CRP, C-reactive protein; Qmax, maximum flow rate; PVR, postvoid residual urine volume; FSFI, female sexual function index.

has already proven to be a better intervention strategy for OAB management, while the effectiveness of PFMT can be affected by patience, empirical guidance, and the maintenance of patient compliance. The duration of follow-up in our study was relatively short, and the compliance of patients was better than expected, while patient compliance may be affected by long-term treatment. A prior study conducted by Cochrane found that PFMT could yield beneficial effects for urinary incontinence, which could be explained by the fact that PFMT could inhibit pathological detrusor contraction by interfering with the urethral/detrusor reflex and increase pelvic floor muscle strength for better impulse control (15,16).

Although the mechanism for the effect of PFMT on OAB symptoms is unclear, we speculate that frequent urination is caused by a lack of training and decreased bladder compliance, which could be corrected by progressively increasing the interval between urinations, resulting in increased urine output and bladder functional capacity. Retraining these patients to fail within normal intervals will restore compliance as volume increases and may contribute to improved symptoms (17-19). A study conducted by Jarvis *et al.* found that PFMT was superior to drug therapy management for detrusor instability (20). However, the superior effects of PFMT over drug therapies gradually disappeared after 6 months (21). Therefore, the training regimen should not only require the patient to contract and relax the pelvic floor muscles for a certain period but should also set specific goals for the duration of contractions, and instructions should be applied to increase the intervals.

The results of this study showed that compared with traditional PFMT, Yun-type training could improve OAB symptoms, FSFI, and sex partner satisfaction. Yun-type training combines more fashionable elements and improves the boredom of simple PFMT through the combination of waist, abdomen, hip, and leg training. The hip training in Yun-type training can cause the contraction of pelvic floor muscles and inhibit the overactivity of the detrusor muscle. The contraction of the pelvic floor muscle group and urethral external sphincter can adjust the urethral internal sphincter. Crotch training in Yun-type training can improve FSFI and spousal satisfaction by improving crotch flexibility and vaginal control. The rhythm of the sound emitted by the waist chain during implementation of Yun-type training and the dancing can echo each other, then the training intensity can also be enhanced by the effect of gravity of the waist chain. Therefore, we speculate that the superior sexual function resulting from Yun-type training can be explained by the fact that it can contract deep and superficial muscle layers, resulting in increased vaginal wall pressure and blood flow, which further improves FSFI and sex partner satisfaction.

The study has several limitations. Firstly, the current study was a single-center study, and the results of this study should be cautiously recommended. Secondly, the characteristics of patients only included age and BMI, while medical history and background exercise regimens were not recorded, which could introduce potential biases and impact the treatment effects between Yun-type training and PFMT. Thirdly, stratified analyses according to patient characteristics for investigated outcomes were not conducted. Additionally, this analysis were based on the short-term intervention study of OAB treatment, and the long-term effects between Yun-type training and PFMT should be observed for middle-aged women with mild to moderate OAB.

The current study found that the use of Yun-type training could yield beneficial effects on OAB symptoms, sexual function, and sex partner satisfaction for middle-aged women with mild to moderate OAB. These results should be verified by further large-scale randomized controlled trials, and the long-term effects of Yun-type training on various stages of OAB should be evaluated.

Acknowledgments

Funding: The study was funded by the Shanghai Key Medical Specialty Program (Grant No. ZK2019A03).

Footnote

Reporting Checklist: The authors have completed the CONSORT reporting checklist. Available at https://atm.amegroups.com/article/view/10.21037/atm-22-3357/rc

Trial Protocol: Available at https://atm.amegroups.com/article/view/10.21037/atm-22-3357/tp

Data Sharing Statement: Available at https://atm.amegroups.com/article/view/10.21037/atm-22-3357/dss

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://atm.

amegroups.com/article/view/10.21037/atm-22-3357/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The protocol of this study was approved by the ethics committee of Shanghai Fifth People's Hospital of Fudan University [No. (2018)Lunshen174]. Signed informed consent forms were obtained from all included patients.

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(English Language Editor: C. Betlazar-Maseh)

Cite this article as: Wang Y, Shi C, Wang J, Shi G. Efficacy of Yun-type pelvic floor optimal training therapy and PFMT on middle aged women with mild to moderate overactive bladder: a randomized controlled trial. Ann Transl Med 2022;10(14):796. doi: 10.21037/atm-22-3357