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GENERAL GYNECOLOGY

Comparison of pelvic floor muscle training isolated and associated with weight loss: a randomized controlled trial

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Abstract

Purpose To analyze whether pelvic floor muscle training (PFMT) associated with weight loss (WL) is better than isolated PFMT to provide additional beneficial effects to urinary symptoms in women with MUI.

Methods A randomized, simple-blind parallel controlled trial was performed and included women with MUI aged between 40 and 65 years and body mass index between 25 and 40 kg/m^2. The sample was randomized into two groups: 11 PFMT + WL and 11 PFMT. Data collection was performed in baseline and after interventions. The primary outcome was to investigate the loss of urine. Secondary aim includes PFM pressure and quality of life. PFMT was performed with two sets of eight repetitions in the first 4 weeks, and with three sets of eight repetitions in the final 4 weeks. The weight loss program was based on the calculation of total energy value needs. Data analysis was performed by SPSS 20.0 software and one-way ANCOVA.

Results 22 volunteers participated in the study. There was no intergroup significant difference in post-intervention ICIQ-SF $F(1, 19) = 7.115$, $p = 0.87$, partial $\eta^2 = 0.001$; manometry $F(1, 19) = 0.608$, $p = 0.44$, partial $\eta^2 = 0.003$; pad test 1 h $F(1, 19) = 0.185$, $p = 0.67$, partial $\eta^2 = 0.01$; QoL $F(1, 19) = 1.018$, $p = 0.32$, partial $\eta^2 = 0.05$; and weight $F(1, 19) = 0.251$, $p = 0.62$, partial $\eta^2 = 0.01$.

Conclusions Weight loss did not provide additional beneficial effects to PFMT in women with overweight or obesity grade I with MUI symptoms.

Keywords Urinary incontinence · Overweight · Physical therapy · Exercise

Introduction

Urinary incontinence (UI) is defined as any involuntary loss of urine due to different processes that alter the storage of the same in the bladder and may be classified into: urgency, urinary loss accompanied by a strong desire to urinate; stress, urinary loss after physical exercise, coughing or sneezing; and mixed, when there are urgency and stress incontinence [1].

Mixed urinary incontinence (MUI) presents higher rates in middle-aged and elderly individuals and the excess of body weight is the most important risk factor [2]. The pathophysiology is associated with the increase of intra-abdominal pressure and inadequate urethral closure, causing a high vesical pressure and consequently favoring the urinary losses [3]. On the other hand, the urgency could be the result of involuntary contractions of the detrusor muscle due to release of excitatory neurotransmitters to the urothelium and changes in the excitability of smooth muscle cells in the bladder [2, 3]. In addition, two studies have also considered that in cases of obesity, adipose cells eliminate cytokines that cause the detrusor instability [2, 3].

Pelvic floor muscle training (PFMT) is recognized as an effective path in conservative treatment of the UI symptoms, as well as a preventive measure for the various types of prolapse and incontinences [4]. This treatment aims to strength of fast and slow fibers that constitute the PFM, to provide a

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greater support of pelvic organs and encourage the urethral closure [5].

It is expected that the conservative interventions and surgical procedures may improve the symptoms and severity of the UI and have a positive impact on quality of life (QoL) [6]. According to the International Consultation on Incontinence Guideline, PFMT is recommended as first-line treatment for weight loss in women with overweight to morbid obesity and aims to reduce the causative agents of urinary loss, such as increase in intra-abdominal pressure and presence of cytokines that interfere with detrusor activity [7]. This recommendation is presented by the document with level A of evidence [7].

Few studies have investigated PFMT associated with a nutritional program for weight loss. Besides, several studies present bariatric surgery as an intervention to cure and/or improve UI; however, conservative interventions could be a good strategy for initial treatment because the risks and the costs are smaller. Furthermore, this modality of intervention may be performed in several places, such as clinics, hospitals and people's home. Considering these assumptions, the aim of the current study was to analyze whether PFMT and weight loss therapy (PFMT + WL) compared to isolated PFMT provides additional beneficial effects to urinary symptoms in women with MUI. The primary outcome was to investigate the loss of urine, evaluated by International Consultation on Incontinence Questionnaire—Short Form (ICIQ-SF). The secondary aim includes repeated measures assessment of the physiological effects of the combined or isolate therapy on PFM pressure, QoL and urinary loss by the 1-h pad test.

Materials and methods

Study design and participants

This study is a randomized, simple-blind parallel controlled trial. The methodological background followed the CONSORT recommendations [8] and registered by Brazilian Registry of Clinical Trials—ReBEC with the identifier number: U1111-1192-5013. The trial was performed in the Multiprofessional Laboratory of Clinical and Epidemiological Research/Onofre Lopes Hospital, Natal, Brazil. All the participants were informed about the objectives and procedures and that they could be randomized into any of the study groups and would participate voluntarily as determined by the resolution No 466/12 of the National Health Council. The project was approved by the Human Research Ethics Committee at UFRN under the protocol number 1.867.867. All the volunteers were guided about the research and signed the informed consent form.

Adults from Natal, Brazil were voluntarily recruited, through advertisements on electronic media and by teams of health professionals from the community. Inclusion criteria used were: (1) women aged between 40 and 65 years; (2) body mass index between 25 and 40 kg/m^2; (3) no exercises performed for the PFM; (4) not having been subjected to urogynecological and bariatric surgery; (5) no neurological diseases present; and (6) present MUI found by ICIQ-SF and 1-h pad test with values above 1 g. The following volunteers were excluded: (1) prolapse of level III or IV according to the Pelvic Organ Prolapse Quantification (POP-Q); (2) those unable to understand simple verbal commands, report of unbearable pain during the assessment; and (3) decided not to continue in research and/or withdrew her consent.

The sample was divided into two groups: Pelvic Floor Muscle Training Group and Weight Loss therapy (PFMTG + WL) and Pelvic Floor Muscle Training Group (PFMTG). Data were collected from January to July 2017. All volunteers were randomized to one of the groups. The flowchart of the study is shown in Fig. 1.

Intervention

Interventions were individualized and performed twice a week for 8 weeks, totaling 16 sessions with duration of 30 min each, in both groups. The treatment was individually and supervised by a specialized physiotherapist. Volunteers also received educational information each week about the anatomy and function of PFM, types of UI, risk factors for PFM, bladder and bowel function.

Pre-training occurred during the 5 initial minutes with exercises that prepared the muscles for the next training. In the eight first sessions, the following was carried out: five quick contractions, five sustained contractions for 3 s, three simulations of cough and eight standing body lift associated with PFM contraction during movements. In the other 8 sessions, the contractions remained with same program, except the cough and the standing body lift, which started to be 5 and 12, respectively.

Pelvic floor muscle training (PFMT)

PFMT of both groups was composed of three types of exercises: breathing, pelvic mobility and abdominal exercise. All exercises were requested to contract the pelvic floor muscles (PFM). In each modality, there were progressions over the course of training, for example: begin—supine position and final—standing. Each exercise was performed with two sets of eight repetitions in the first 4 weeks and with three sets of eight repetitions in the final 4 weeks. The rest time between exercises was 30 s (Table 1).

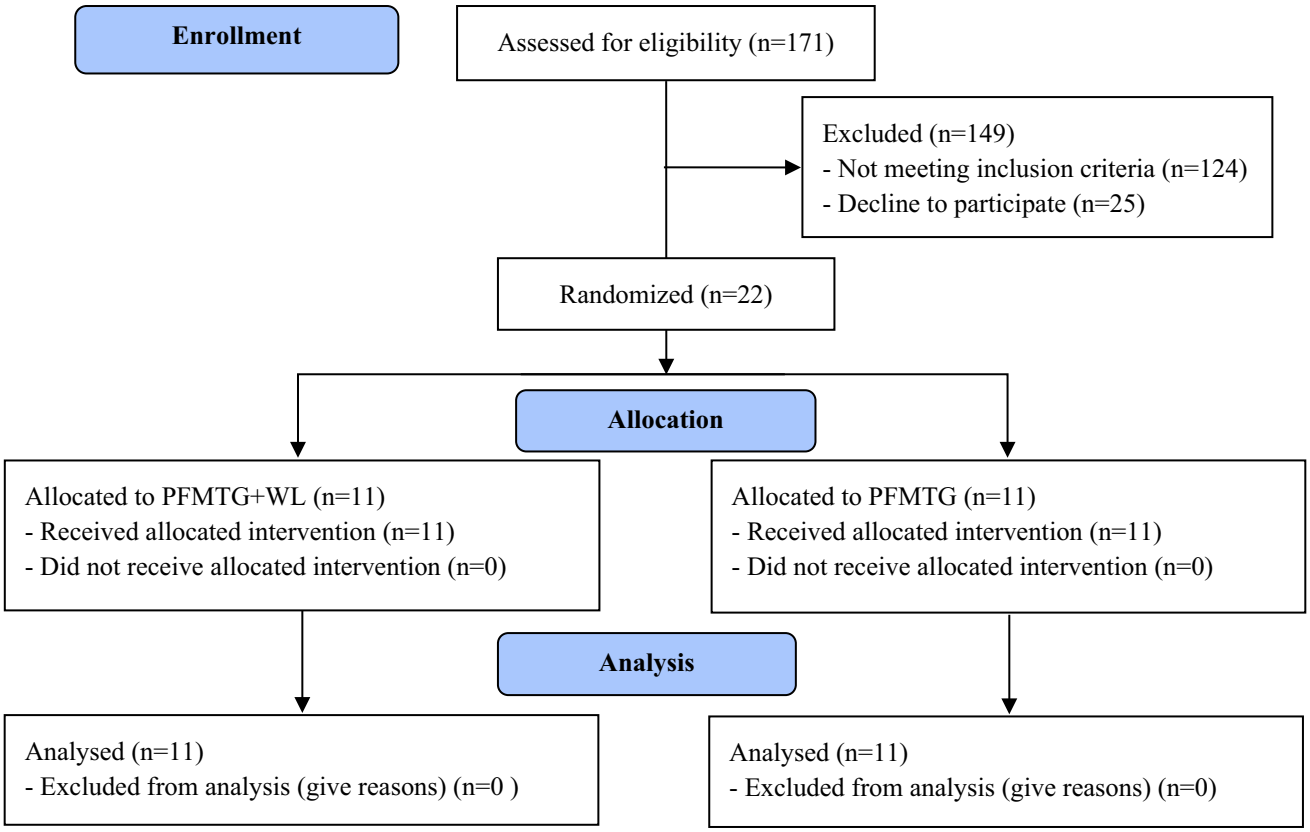

Fig. 1 Flowchart for the study

Weight loss therapy

Weight loss therapy was conducted with three meetings with a nutritionist. In the first meet, the volunteer underwent a nutritional assessment about use of supplementation, presence of edemas, skin alterations, excretory functions and gastrointestinal symptoms. Dietary intake (presence of allergies or intolerances, preferences or food aversions, who buys the food, who prepares, consumption of fried foods, sweets, oil, fruit and vegetables) and daily record of 24 h (information of schedules, food, characteristics and measures of what was consumed in the last 24 h, and regular consumption) were also assessed.

The nutritional protocol was individualized and based on the calculation of the needs of the total energy value—TEV (TEV = BMR (basal metabolic rate) × Af (physical activity level)–readjust). From the TEV calculation, a dietary plan aiming at creating a deficit of 500–1000 kcal/day was prescribed, targeting a weight loss of 0.5–1 kg/week [9].

The nutritional guidelines were based on a low-calorie feed, passed during the assessment and in the following months, with a monthly visit for follow-up totaling two meetings at the end of the protocol. In addition, there were guidelines in the form of booklet, explaining both the preparation and storage of food as nutritional information of the same. In these meetings, a new evaluation and a new physical examination were carried out (measurement of weight, waist circumference and hip circumference). At the end of each meeting, new goals were outlined, as well as changes in diet plan, if necessary.

In addition to the monthly follow-up, there was a telephone follow-up made 15 days after the face-to-face meeting, totaling two contacts (not presently) at the end of the protocol. The goal of the calls was the clarification of doubts, to reinforce the presence in the monthly visits and closer follow-up regarding the nutrition with the volunteers.

Outcomes

Data collection occurred in two stages: initial evaluation and final evaluation (performed after 16 sessions of intervention), as shown in Fig. 2. During initial evaluation, a form was used, which presented sociodemographic data, information about pre-existing diseases, the use of medication during last 3 months and life habits, urologic, gynecologic and obstetric history.

The primary outcome of the study was defined as urinary loss measured by ICIQ-SF, which is a simple, brief

Table 1 Pelvic floor muscle training program

Week	Exercise training	PFMT + breathing	PFMT + exercise of pelvic mobility	PFMT + abdominal exercise
1	5 fast contractions, 5 sustained contractions, 3 coughs, 8 standing body lift	Breathing—2×8 (supine)	Pelvic tilt—2×8 (sitting: Swiss ball)	Transversus abdominis muscle contraction—2×8 Bridge exercise—2×8 (2 ft on the ground)
2	5 fast contractions, 5 sustained contractions, 3 coughs, 8 standing body lift	Breathing—2×8 (supine)	Pelvic tilt—2×8 (sitting: Swiss ball)	Transversus abdominis muscle contraction—2×8 Bridge exercise—2×8 (2 ft on the ground)
3	5 fast contractions, 5 sustained contractions, 3 coughs, 8 standing body lift	Breathing—2×8 (sitting)	Pelvic tilt—2×8 (standing)	Plank exercise (5″ (sn.5) e 10 s (sn.6) Bridge exercise—2×8 (1 ft on the ground)
4	5 fast contractions, 5 sustained contractions, 3 coughs, 8 standing body lift	Breathing—2×8 (sitting)	Pelvic tilt—2×8 (standing)	Plank exercise (15″ (sn.7) e 20 s (sn.8) Bridge exercise—2×8 (1 ft on the ground)
5	5 fast contractions, 5 sustained contractions, 5 coughs, 12 standing body lift	Breathing—3×8 (standing)	Pelvic tilt—3×8 (standing)	Plank exercise (25″ (sn.9) e 30 s (sn.10) Bridge exercise—3×8 (2 ft on the ball)
6	5 fast contractions, 5 sustained contractions, 5 coughs, 12 standing body lift	Breathing—3×8 (standing)	Pelvic tilt—3×8 (four supports)	Plank exercise (35″ (sn.11) e 40 s (sn.12) Bridge exercise—3×8 (2 ft on the ball)
7	5 fast contractions, 5 sustained contractions, 5 coughs, 12 standing body lift	Breathing—3×8 (Swiss ball)	Pelvic tilt—3×8 (four supports)	Plank exercise (45″ (sn.13) e 50 s (sn.14) Bridge exercise—3×8 (2 ft on the ball)
8	5 fast contractions, 5 sustained contractions, 5 coughs, 12 standing body lift	Breathing—3×8 (Swiss ball)	Pelvic tilt—3×8 (four supports)	Plank exercise (55″ (sn.15) e 60 s (sn.16) Bridge exercise—3×8 (2 ft on the ball)

PFMTG pelvic floor muscle training, *sn* session number

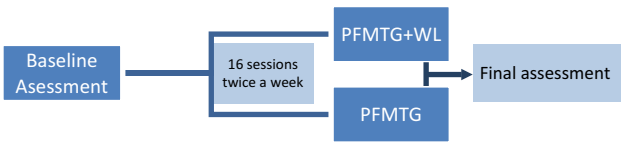

Fig. 2 Assessments and interventions periods in both groups. PFMTG + WL, pelvic floor muscle training group and weight loss therapy group; PFMTG, pelvic floor muscle training group

and self-applied questionnaire that qualifies the urinary loss and assesses the impact of the UI on quality of life. It was translated and validated to Portuguese language by Tamanini et al. [10]. It consists of four questions that evaluate the frequency, severity and the impact of UI, in addition to a set of eight self-diagnosis items that allow evaluating the causes or situations of UI experienced by the patients. The total score ranges from 0 to 21 points and is divided into: no impact (0 point); light impact (1–3 points); moderate (4–6 points); severe (7–9 points) and very severe (10 or more points) [10].

Secondary outcome includes manometry, quality of life (QoL) and loss of urine according to 1-h pad test. The pressure of PFM was assessment using a manometry by Peritron™ model 9300AV. For the exam, the volunteer was advised to empty her bladder initially and adopt lithotomy position. The pressure generated by the PFM contraction is perceived through the introduction of the probe into the vagina, about 9–10 cm. The value is given in cmH_2O [11]. The volunteer was advised to perform three maximum contractions with an interval of 30 s among them [11], and not to involve the PFM contraction with gluteus, adductor and abdominal muscles. The verbal command for muscle contraction was "squeeze the probe with maximum force" and "squeeze the vagina". The value considered was the maximum value among the three attempt [11].

To evaluate QoL, The Utian Quality of Life (UQOL) was used. This questionnaire was translated into Portuguese and

validated by Galvão et al. [12]. UQOL aims to assess the QoL of women in the peri- and postmenopausal period. There are 23 questions divided into four domains of QoL: occupational, health, emotional and sexual. Each UQOL topic is answered using a Likert scale, where the response possibilities range from 1 (very false) to 5 (very true). This score was checked based on affirmative or negative phrases, and the patient scores according to the degree of agreement that statement fits with his or her state in the last month. A final score is computed for each of the domains considered [13].

The 1-h pad test was applied to quantify urinary losses. The volunteers received a pad (previously weight) and were instructed to use it close to the external urethral meatus. The patient ingested 500 mL of water at rest for 15 min. After 15 min, the volunteer performed some actions simulating activities of daily living (walk for 30 min, go up and down one flight of stairs, sit and get up ten times, cough ten times, pick up objects on the floor five times, run in the same place for 1 min and wash the hands in running water for 1 min). Finally, the pad was removed and reweighed on the precision scale. Urinary losses are evaluated and classified: losses to 1 g are considered insignificant; between 1.1 and 9.9 g are classified as light losses; between 10 and 49.9 g are moderate losses; and above 50 g severe losses [1]. To measuring weight, the volunteer will climb on the platform of the scale without shoes and will remain for about 5 s or until the scale register. Weight was measured using a portable digital scales (Plenna®, São Paulo, Brazil), with a capacity for 150 kg. The participants were instructed to remove shoes and any additional objects.

The sample size was calculated by Miot formula [14], using the error of 1.96 (5%), error value β of 0.84 (20%) and the minimum difference between the averages of 04 points in the final score of ICIQ-SF. The value of 4 points is equivalent to the minimum value for change in the score of the questionnaire. The number of participants was 22, with 11 women in each group. Randomization was performed in parallel groups (1:1), through a numerical sequence on randomization.com. Allocation concealment was fulfilled using opaque envelopes and only one searcher who participated in the intervention process had access to it. Assessments were performed by a blinded evaluator, following the same initial training program.

Statistics analysis

Data were analyzed using the statistical software SPSS 20.0 (Statistical Package for the Social Science) assigning a significance level of $p < 0.05$. Initially, Shapiro–Wilk test was used to evaluate the normality of the data. The descriptive statistics for sociodemographic, clinical and obstetrics variables with Chi square test or paired *t* test was used. To compare primary and secondary variables at baseline vs post-intervention, paired *t* test (or non-parametric) was used. One-way ANCOVA was used to determine the effect of a PFMTG + WL and PFMTG on post-intervention for primary and secondary outcomes. The main purpose of running the one-way ANCOVA was to establish whether there were any statistically significant group differences on the dependent variable after adjusting for the time (before and after).

Results

Of the study participants, 25 women declined to participate because they do not wanted to pass 2 months in a treatment. Twenty-two women with MUI completed the intervention period and there were no losses of volunteers during the treatment (Fig. 1). There was no statistical difference between groups in age, number of pregnancies and physical activity (Table 2). ICIQ-SF and others clinical variables did not show differences between the groups in baseline.

Primary and secondary outcomes are shown in Fig. 3. Intragroup analysis showed a significant difference in ICIQ-SF ($p = 0.004$) for PFMTG + WL and for PFMTG ($p = 0.002$). These results indicate that both protocols decrease the loss of urine. However, after adjustment for pre-intervention ICIQ-SF, there was no statistical significant difference in post-intervention ICIQ-SF between the groups $F(1,19) = 7.115$, $p = 0.87$, partial $\eta^2 = 0.001$.

Manometry showed a significant improvement (before vs after treatment) for PFMTG + WL and PFMTG ($p = 0.01$; $p = 0.03$, respectively) but when comparing protocols, no differences were found between the groups $F(1,19) = 0.608$, $p = 0.44$, partial $\eta^2 = 0.003$.

No differences were found for 1-h pad test in PFMTG + WL ($p = 0.31$) and PFMTG ($p = 0.09$) and between groups after protocol $F(1,19) = 0.185$, $p = 0.67$, partial $\eta^2 = 0.01$.

QoL did not show significant difference before vs after protocols for PFMTG + WL and PFMTG ($p = 0.45$; $p = 0.64$, respectively). There was no difference between the groups after treatment $F(1,19) = 1.018$, $p = 0.32$, partial $\eta^2 = 0.05$.

No difference for weight was found in PFMTG + WL ($p = 0.95$) and for PFMTG ($p = 0.50$) in intragroup analysis and between the groups after treatment $F(1,19) = 0.251$, $p = 0.62$, partial $\eta^2 = 0.01$.

Discussion

Our results showed that both groups of the intervention presented similar improvement in losses of urine, quality of life and PFM pressure. It is known that the women with MUI must perform the PFMT combined with the bladder

Table 2 Sociodemographic, clinical and lifestyle characteristics of the sample at baseline

Variable	PFMTG + WL ($n = 11$)	PFMTG ($n = 11$)	p value*
Age	51.50 ± 2.10	49.36 ± 3.29	0.59
Number of pregnancies	3.36 ± 0.59	2.45 ± 0.38	0.21
Min/week of physical activity	290 ± 86.52	185 ± 30.41	0.44
ICIQ-SF	12.09 ± 4.45	15.27 ± 2.61	0.055
Manometry (cmH_2O)	25.75 ± 26.03	16.97 ± 12.33	0.32
QoL	80.18 ± 5	71.91 ± 12.65	0.057
1-h pad test (g)	1.38 ± 1.50	4.94 ± 5.66	0.10
Weight (kg)	73.48 ± 12.57	72.08 ± 6.61	0.74
Years of study			0.62
Less than 8 years	33.3%	18.2%	
Between 8 and 12 years	0%	18.2%	
13 years	25.0%	27.3%	
More than 13 years	41.7%	36.4%	
Marital status			0.28
Married	58.3%	81.8%	
Single	25.0%	0%	
Widow	8.3%	0%	
Divorced	8.3%	18.2%	
Religion			1.00
Catholic	58.3%	54.5%	
Protestant	41.7%	45.5%	
Type of delivery			0.01*
Normal	41.7.0%	90.9%	
Cesarean	16.7%	9.1%	
Normal and Cesarean	33.3%	0%	
Regular menstrual cycle			0.03*
Yes	25.0%	63.6%	
No	75.0%	36.4%	
Sexually active			0.64
Yes	66.7%	72.7%	
No	33.3%	27.3%	
Sedentary			0.66
Yes	50.0%	63.6%	
No	50.0%	36.4%	

Age, number of pregnancies and min/week of physical activity in mean and standard deviation

PFMTG + WL pelvic floor muscle training group and weight loss, *PFMTG* pelvic floor muscle training group, *WC* waist circumference (cm), *HC* hip circumference (cm), *BMI* body mass index (Kg/m^2), *ICIQ-SF* International Consultation on Incontinence Questionnaire—Short Form, *95% CI* 95% confidence interval for mean

*Statistically significant at $p < 0.05$ when the Chi square was applied

training [15]. Furthermore, it is recommended the weight loss and exercises for obese women with UI because the benefits of this decrease in weight are beyond the UI improvement isolated [15]. Both recommendations have a high degree and high quality of evidences. Our program was based according to this information; however, there was no significant difference. It is possible that this recommendation is better directed to morbidly obese patients and our study included volunteers with overweight and obese I degree.

According to Qaseem et al. [15], non-pharmacological therapies such as PFMT are an effective and low-cost management for UI and have large magnitude of benefit for increasing the rates of continence. The training is based on two essential functions of the integrality theory: support of pelvic organs and contribution in the closure mechanism of urethral sphincter [16]. The PFM voluntary contraction promotes a closure and suspension of pelvic organs, resulting in urethral closure, stabilization and resistance to downward movement [16]. Thus, the PFMT is indicated for UI cases.

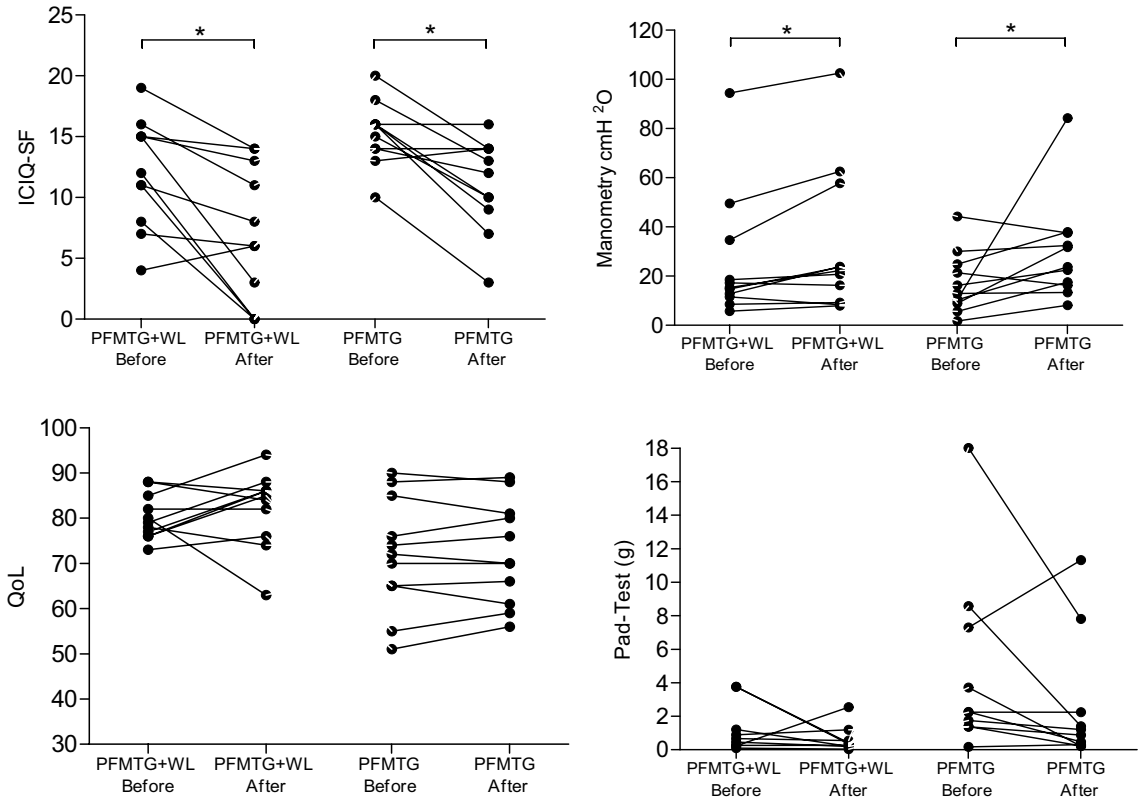

Fig. 3 Clinical outcomes. *Statistically significant at $p < 0.05$ with paired t test (or non-parametric). According to one-way ANCOVA, protocols did not differ between the groups

Muscle strengthening isolated and in combination with the bladder training and weight loss with global exercises for obese women were effective in achieving continence or improve the symptoms of urinary loss [15]. Our study also found similar results, but the nutritional program was not shown to be a differential for improvement and/or cure of UI. Manometry measure the PFM pressure changes captured in the vagina in response to voluntary contraction of PFM. It is suggest that manometry can provide reliable and reproducible data regarding PFM strength. A significant improvement in manometry was shown in both groups in post-evaluation.

The study of Gozukara et al. [17] observed that the weight loss significantly reduced the UI episodes in 40% of their volunteers who followed a program of food education and physical activity, suggesting a decrease in abdominal and intravesical pressures. Similarly, Wing et al. [18] conducted an intensive 6-month behavioral weight loss program followed immediately by a 12-month weight maintenance program. The authors concluded that weight loss from 5 to 10% of body weight already results in benefits for obese and incontinent women [18]. Our volunteers were submitted to the weight loss program and reduced by around 4 kg after the treatment, but there was no statistical difference in the weight when comparing both the groups.

Although there was a decrease in almost 4 kg on average after the treatment in the PFMTG + WL, there was no difference in urinary symptoms when compared to the group that performed isolated PFMT. Perhaps, it is explained by the fact that volunteers did not significantly reduce waist circumference (WC). The WC reduction is associated with the reduction in intra-abdominal pressure and consequently with lower pressure on the pelvic floor components, in addition the decrease of WC is also responsible for the reduction in the production of inflammatory cytokines that are capable of increasing the urgency to urinate and contribute to the emergence of incontinence [19]. The literature indicates that women with higher values of WC have more symptoms of the lower urinary tract, such as UI [20]. This information generates a reflection from a clinical point of view: the reduction of weight and measures seem to have a greater impact on overload of the women's PFM with overweight or obesity, leading to an improvement of UI [21]. The decrease on the overload generates a positive impact on the PFM even if the reduction in weight is in small percentages of the body weight [18].

In clinical studies, after bariatric surgery, it is noticed that weight loss provides benefits in PFM, leading to a decrease in UI episodes [22]. The study of Burgio et al. [6] evaluated 101

women and showed that after 12 months of bariatric surgery weight loss was associated with a reduction in 44% of the prevalence of UI. In spite of knowing the benefits of weight reduction in PFM function, the bariatric surgery is not a recommendation for UI treatment, besides presenting higher costs, expose the patient to risks from surgical complications.

Another tool to evaluate the effectiveness of the treatment was the 1-h pad test. Although this exam has not presented a statistically significant difference when comparing pre-post-intervention in each group, there was a decrease in both groups. It is important to realize that the PFMTG + WL had a final mean lower than 1 g, which according to the International Continence Society [23], it is considered as continent. It is suggested that this may have occurred because of the weight loss program that favored the WC measurements reduction.

It was observed that the urinary symptoms reduced around 6–7 points in the final score of the ICIQ-SF after both treatments. A study by Nystrom et al. [24] evaluated 214 women with MUI, before and after PFMT, and found a mean value of 2.5 as the minimum difference clinically relevant in total score of the ICIQ-SF. This difference was enough for the participants to report ameliorate by patient global impression of improvement, which corroborates with our study.

It was possible to observe that 75% of the participants in the PFMTG + WL reported being "much better" regarding their urinary complaint, when compared before vs after intervention. This finding may be caused by the fact that the PFMTG + WL received nutrition assistance aimed at weight loss, provided not only to the improvement of UI symptoms as well as improvement in general well-being. Beyond the reduction of measures and weight on PFMTG + WL, the interventions might have positively influenced the quality of life, turning the volunteers more confident and satisfied with their physical appearance and aesthetics.

Some limitations of the present study must be acknowledged. First, the results of this study might be biased due to the limited sample size. On the other hand, the use of this protocol in this population could provide guidance for selecting symptom measures to determine the power and sample size necessary for future trials with UI. Second, the follow-up period was not performed and the results of this study should be interpreted for immediate effect after 8 weeks of intervention. The recommendation of increase the sample size adds that the follow-up investigation should be considered in future investigations.

Conclusion

It is concluded that the weight loss did not provide additional beneficial effects to urinary loss, PFM pressure and QoL in women with overweight or obesity grade I with MUI. However, it is possible that interventions were capable to reduce measures, even not being statistically significant with the differences.

Author contributions MO: protocol/project development, data collection, and writing of the manuscript. VL: data planning and collection. RP: protocol/project development, data analysis, and writing of the manuscript. ESF: writing of the manuscript, supporting data analysis and proofreading. AF: protocol/project development, data analysis, and writing of the manuscript. MM: protocol/project development, data analysis, and writing of the manuscript.

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Compliance with ethical standards

Conflict of interest We declare that we have no conflict of interest.

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