Sexual Function and Quality of Life of Women with Stress Urinary Incontinence: A Randomized Controlled Trial Comparing the Paula Method (Circular Muscle Exercises) to Pelvic Floor Muscle Training (PFMT) Exercises

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ABSTRACT

Aim. To compare the effectiveness of the Paula method (circular muscle exercises) vs. pelvic floor muscle training (PFMT) exercises on sexual function (SF) and quality of life (QoL) of women with stress urinary incontinence (SUI).

Methods: A randomized controlled trial (RCT) was conducted in outpatient urban community clinics serving diverse socioeconomic populations between September 2004 and July 2005. The intervention included two exercise regimens: Paula method—12 weeks of private 45 minutes sessions; PFMT—12 weeks of group (up to 10 participants) sessions of 30 minutes in length once a week, for 4 weeks plus two additional sessions, 3 weeks apart.

Main Outcome Measures. The Pelvic Organ Prolapse/Urinary Incontinence Sexual Questionnaire; the Incontinence Quality of Life Questionnaire; 1-hour clinic pad test; gynecological examination; demographic/health history.

Results. Sixty-six women in the Paula group and 60 women in the PFMT group. The mean SF scores post interventions were 38.72 (5.35) in the Paula group and 38.07 (5.80) in the PFMT group. SF score improvement was found to be significant in both groups (Paula, P = 0.01; PFMT, P = 0.05), as was in the QoL scores (Paula, P < 0.001; PFMT, P < 0.001), with no significant difference between groups. There was a significant correlation between the mean SF score and the mean QoL score after the intervention (Paula: r = 0.4, P = 0.002; PFMT: r = 0.4, P = 0.009). A mild to moderate significant correlation was also found between the SF score and pad test results in both groups post intervention (r = −0.3, P = 0.02; r = −0.3, P = 0.04, respectively).

Conclusion. This RCT study demonstrated the effectiveness of two exercise methods on SF and QoL in women suffering from SUI. The Paula method of exercise was presented for the first time in the literature as a conservative noninvasive treatment for SUI and SF. Liebergall-Wischnitzer M, Paltiel O, Hochner Celnikier D, Lavy Y, Manor O, and Woloski Wruble AC. Sexual function and quality of life of women with stress urinary incontinence: A randomized controlled trial comparing the Paula method (circular muscle exercises) to pelvic floor muscle training (PFMT) exercises. J Sex Med **:**:**:** **.

Key Words. Stress Urinary Incontinence; Sexual Function; Noninvasive Interventions; Pelvic Floor Muscle Training; Paula Method

This randomized controlled trial is registered on http://www.clinicaltrials.gov. no. NCT00197314.

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Introduction

Urinary incontinence (UI) has an overall prevalence of 25% in adult women and increases with age. UI is subdivided into different types which mainly include: stress UI (SUI), urgency UI (URI), and mixed UI (MIX) [1,2]. SUI is the most frequently found type of incontinence (50%), and peaks between the ages of 45 and 49. SUI has been documented as affecting a woman’s quality of life (QoL) specifically in the areas of avoidance and limiting behaviors, psychosocial behaviors, and sexual function (SF) [3–8]. In general, women with SUI report fear and embarrassment related to penetration incontinence, pain during intercourse, less ability to reach orgasm, less lubrication, and a decrease in satisfaction [6,9–11]. Besides surgical interventions, there are a wide range of conservative treatments for incontinence including lifestyle and behavioral interventions, pharmacological treatments, vaginal cones, biofeedback, and pelvic floor muscle training (PFMT) [12,13].

PFMT is recommended as a first-line treatment for all UI types [2] and was found to be effective in women with SUI in their 40s and 50s who participated in supervised programs for a minimum of a 3-month period [12]. PFMT is based on the exercise of the levator ani muscles. The pubococcygeal muscle, a part of the levator ani, is the main support for the bladder neck during the time of increased intra-abdominal pressure [14,15]. The aim of PFMT is to improve the timing of vaginal muscle contractions while strengthening them [12].

Recently, an additional conservative treatment has been reported as effective for SUI treatment. The Paula method is a circular muscle exercise protocol that works on the premise that all sphincters in the body are synchronized, with the movement of one affecting the other [16]. The Paula method theory claims that one can rehabilitate damaged muscles by contracting and relaxing specific “circular” muscles in other areas of the body. For example, according to the theory, levator ani muscle weakness resulting in SUI, can be improved by exercising circular muscles of the eye, mouth, and others [16]. The exact mechanism is unknown though speculations have been raised that one sphincter affects others due to oscillations in the spinal cord [17]. The Paula method has been used in Israel for several decades and found to be effective in three clinical trials [3,4,18].

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There is a growing but limited non-randomized-controlled trial (RCT) literature concerning SF before and after surgery [10,11] for SUI, and only a few RCTs focus on SUI in women with SUI before and after noninvasive treatment [19–21]. Two of these [20,21] included postnatal women, and none have examined the Paula method in relation to SF. The objective of this study was to compare the effectiveness of the Paula method vs. the PFMT on SF and QoL of women with SUI.

Methods

This study presents original findings related to SF, from part of an RCT which examined the efficacy of two exercise interventions for women with SUI. The results regarding urinary leakage have previously been reported [4].

Study Population

Announcements and contact information were placed in local newspapers and outpatient clinic bulletin boards in three communities for women with SUI symptoms. Primary telephone screening included women who described themselves as healthy in general, aged 20–65 with a history of self-reported SUI, and the ability to understand instructions in Hebrew or English. Exclusion criteria were: pregnant or breastfeeding women as well as those within 12 weeks of delivery, 6 weeks of abortion, or 6 months of pelvic surgery. Eligible candidates were invited to a clinical appointment which included a 1-hour clinical pad test. If the pad test result was ≥1 g, the woman was examined by a study gynecologist. The gynecologist’s examination determined final eligibility for inclusion in the study which excluded women with grade three or higher pelvic organ prolapse; women with cardiac, respiratory, psychiatric, and/or neurological illnesses that limited physical activity; previous surgery for UI; or previous pelvic radiation therapy.

Study participants were given a study number and the contact information of the research coordinator from whom they obtained their exercise group assignment. Participants were randomized to one of two research groups, Paula or PFMT instruction, and stratified by age (20–50 and 51–65) and place of residence, in order to keep those groups representation. The nurses who administered the pad test before and after the intervention were blinded to the intervention group. The research coordinator was blinded to the participants’ baseline status and was only aware
Sexual Function Incontinence Paula/PFMT

of their place of residence and age. The randomization list was not shared with the Primary Investigator (PI) until the final participant completed the post-intervention pad test. The study questionnaires were administered before the intervention and after the intervention (after a 12-week period).

Outcome Measures
The RCT included several instruments: 1-hour clinic pad test, gynecological examination, demographic/health history, the Incontinence Quality of Life Questionnaire (I-QOL) and the Pelvic Organ Prolapse/Urinary Incontinence Sexual Questionnaire (PISQ-12). This report will focus on the sexuality and QoL results from the RCT. Additional information concerning the data collection tools and process is available [4].

The PISQ-12 includes 12 items including behavioral emotive factors, physical factors, and partner-related factors in relation to the effect of urinary leakage and/or pelvic organ prolapse on SF 22]. Only those completing at least 10 items of the PISQ-12 instrument were included, as was recommended by the instrument developers [22]. The total score range was from 0 to 48, with higher scores evidencing better SF. The mean SF score in this article is based on the PISQ-12 questionnaire. The original 12th question, a self-report of “orgasm intensity,” was modified to be a question of “orgasm frequency,” as a result of validity examination for relevancy for the study population. The Cronbach’s alpha of the Hebrew version is 0.75 before the intervention, with a post-intervention Cronbach’s alpha of 0.80.

The I-QOL is a 22-item scale subdivided into three subscores: avoidance and limiting behavior score (8 items), psychosocial impact score (ps; 9 items), and social embarrassment score (5 items). Questions were answered on a Likert scale of 1–5, with 1 = extremely and 5 = not at all, with a total score transformed to a 0–100 scale, with higher scores indicating greater QoL. In the “ps” domain there is a specific question regarding sexuality: “I worry about having sex” and related questions such as: “I feel depressed,” “Incontinence is always on my mind,” “My incontinence makes me feel like I’m not a healthy person.” The Cronbach’s alpha of the English and the Hebrew language version of questionnaire was 0.95 [7].

A demographic and personal health questionnaire was included which contained background data of the participants, a general health assessment, obstetric and gynecological histories including estrogen status, and a subjective assessment of urinary leakage, annoyance level, and other health issues [4].

Intervention
Paula Intervention
Three certified Paula method instructors worked with the participants, which included a private 45 minutes session per week for 12 weeks, the clinical practice standard for this intervention. Every participant had the same Paula instructor throughout the intervention for the 12 sessions. Participants were encouraged to practice daily at home as well. In order to promote consistency in the instruction of the participants, the instructors were trained together for this research. Paula exercises included the following: contracting and relaxing eyelids—the upper lip is raised to the nose as the nose is lowered to the upper lip; contracting and relaxing the levator ani muscles alone or with long “sh” sound. All exercises can be done by lying on the back, feet on the mattress, knees bent, sitting, or standing.

PFMT Intervention
Ten physiotherapists worked with the PFMT groups which included 1–10 people for 30 minutes; every participant had the same PFMT instructor throughout the intervention. They met once a week for 4 weeks, which is the clinical practice standard for this intervention. After the first month, there were two more meetings, 3 weeks apart, for a total of 6 sessions over 12 weeks, as per the literature source [3,12,20,23]. All participants were encouraged to practice at home. The instructors followed a predetermined frame of exercises to promote consistency in instruction. PFMT exercise included the following: identifying the levator ani by raising the vagina from the chair the person is sitting on; contracting and releasing levator ani muscle with prolonged contractions or rapid contractions or gradual contractions. Perform these exercises 10 seconds apart between contractions and 1–2 minutes apart between exercises. All exercises can be done by sitting, lying, standing, or walking.

A detailed description of the intervention methods can be found in the literature [3,4].

Sample Size
Two hundred women (100 in each group), based on a two-tailed test, with α = 0.05 and 80% power, were calculated to be included in the RCT. Due to sample dropout, 40 additional participants were
recruited using the same method of sampling randomization [4]. One hundred and eighty-seven women met the inclusion criteria for this report, representing 77.9% of the overall RCT study population.

Analysis
For all statistical tests, a two-sided P value of <0.05 was considered statistically significant. We used univariate analysis of variance and a multiple linear regression model for associations between the study groups and continuous outcomes variables. Correlation coefficients were calculated using Pearson methods. Changes within each group and between groups were assessed by paired and independent t-test.

Protection of Human Subjects
The study was approved by the Institutional Review Board (Hospital Helsinki Committee) with women providing written informed consent after receiving explanations of the study’s goals and procedures.

Results
There were 66 women in the Paula group and 60 women in the PFMT group, with all participants being sexually active (See Figure 1). The mean age of the women was 46.7 (8.0) and 46.6 (8.9) for the Paula group and the PFMT group, respectively. Approximately half of the women (N = 34, 51.5%) in the Paula group and 36 (60%) women in the PFMT group reported urgency sensations in addition to their SUI. Participant “drop out” after the intervention was not statistically significant between the groups (See Figure 1).

Before Intervention
The mean SF score before the intervention was 37.32 (5.80) in the Paula group and 37.15 (5.65) in the PFMT group and QoL scores were 71.2 (23) in the Paula group and 66.6 (22.5) in the PFMT group. At baseline, there were no significant differences between the groups in any of the background characteristics, SF scores, or QoL scores (Table 1). The symptoms of urinary leakage were similar for both groups with the majority of
women reporting moderate to large amounts. Other symptoms like stool incontinence or sleeping disturbances showed a similar trend between groups as well, with only flatulence displaying a significant difference ($P = 0.04$) (Table 2). Approximately half of the women ($N = 33, 50.0\%$) in the Paula group and 27 (45\%) women in the PFMT group had not consulted with a physician about their urinary leakage prior to the trial. No significant correlation was found between the SF score and pad test results or pelvic organ prolapse (POP) staging in both groups. Both groups demonstrated a moderate, statistically significant correlation between SF score and QoL (Paula: $r = 0.3$, $P = 0.003$; PFMT: $r = 0.4$, $P = 0.003$).

**After the Intervention**
Both groups improved after the interventions with significant increases in the mean SF and QoL scores (Table 3). The mean SF score was 38.72 (5.35) in the Paula group and 38.07 (5.80) in the PFMT group. SF score improvement was found to be significant in both groups (Paula, $P = 0.01$; PFMT, $P = 0.05$), as was the QoL scores (Paula,

### Table 1: Demographic characteristics before the intervention

<table>
<thead>
<tr>
<th>Variable</th>
<th>Paula</th>
<th>PFMT</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age; Mean (± SD)</td>
<td>46.7 (8.0)</td>
<td>46.6 (8.9)</td>
<td>N/S</td>
</tr>
<tr>
<td>Pad test (Grams); Mean (± SD)</td>
<td>11.2 (13.5)</td>
<td>11.7 (20.5)</td>
<td>N/S</td>
</tr>
<tr>
<td>I-Qol; Mean (± SD)</td>
<td>71.2 (23.0)</td>
<td>66.6 (22.5)</td>
<td>N/S</td>
</tr>
<tr>
<td>I-Qol. alb; Mean (± SD)</td>
<td>67.5 (26.6)</td>
<td>26.6 (22.5)</td>
<td>N/S</td>
</tr>
<tr>
<td>I-Qol. ps; Mean (± SD)</td>
<td>78.3 (25.4)</td>
<td>3.9 (24.5)</td>
<td>N/S</td>
</tr>
<tr>
<td>I-Qol. se; Mean (± SD)</td>
<td>64.4 (26.1)</td>
<td>9.7 (26.4)</td>
<td>N/S</td>
</tr>
<tr>
<td>Total SF score; Mean (± SD)</td>
<td>36.8 (5.8)</td>
<td>36.5 (5.7)</td>
<td>N/S</td>
</tr>
<tr>
<td>Education (years); Mean (± SD)</td>
<td>15.5 (3.0)</td>
<td>15.2 (3.0)</td>
<td>N/S</td>
</tr>
<tr>
<td>Pregnancies; Mean (± SD)</td>
<td>4.8 (2.2)</td>
<td>4.3 (2.0)</td>
<td>N/S</td>
</tr>
<tr>
<td>Vaginal deliveries; Mean (± SD)</td>
<td>3.6 (1.8)</td>
<td>3.3 (1.5)</td>
<td>N/S</td>
</tr>
<tr>
<td>People at home; Mean (± SD)</td>
<td>4.6 (2.2)</td>
<td>4.2 (1.4)</td>
<td>N/S</td>
</tr>
<tr>
<td>Religiosity; Number (%).</td>
<td>47 (73.4)</td>
<td>35 (59.3)</td>
<td>N/S</td>
</tr>
<tr>
<td>Traditional + secular</td>
<td>17 (26.6)</td>
<td>24 (40.7)</td>
<td>N/S</td>
</tr>
<tr>
<td>Ultraorthodox + religious</td>
<td>59 (89.4)</td>
<td>54 (90)</td>
<td>N/S</td>
</tr>
<tr>
<td>Married</td>
<td>7 (10.6)</td>
<td>6 (10)</td>
<td>N/S</td>
</tr>
<tr>
<td>Unmarried</td>
<td>37 (60.7)</td>
<td>43 (72.4)</td>
<td>N/S</td>
</tr>
<tr>
<td>Estrogen status, Number (%)</td>
<td>24 (39.3)</td>
<td>16 (27.6)</td>
<td>N/S</td>
</tr>
<tr>
<td>&lt;10,000 IS</td>
<td>43 (67.2)</td>
<td>34 (56.7)</td>
<td>N/S</td>
</tr>
<tr>
<td>Endogenous or exogenous</td>
<td>21 (32.8)</td>
<td>26 (43.3)</td>
<td>N/S</td>
</tr>
<tr>
<td>POP; Number (%)</td>
<td>41 (63.1)</td>
<td>39 (67.2)</td>
<td>N/S</td>
</tr>
<tr>
<td>Non (No prolapse + stage 1)</td>
<td>24 (36.9)</td>
<td>19 (32.8)</td>
<td>N/S</td>
</tr>
<tr>
<td>Yes</td>
<td>34 (51.5)</td>
<td>36 (60.0)</td>
<td>N/S</td>
</tr>
<tr>
<td>No</td>
<td>32 (48.5)</td>
<td>24 (40.0)</td>
<td>N/S</td>
</tr>
</tbody>
</table>

$^a$ Difference between groups

**PFMT** = pelvic floor muscle training; **SD** = standard deviation; **I-Qol** = Incontinence Quality of Life Questionnaire; **alb** = avoidance and limiting behavior score; **ps** = psychosocial impact score; **se** = social embarrassment score; **SF** = sexual function; **POP** = pelvic organ prolapse; **IS** = Israeli Shekel

### Table 2: Symptoms subjective data before the intervention

<table>
<thead>
<tr>
<th>Variable</th>
<th>Paula N (%)</th>
<th>PFMT N (%)</th>
<th>$P^*$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leakage frequency</td>
<td>14 (41.2)</td>
<td>20 (58.5)</td>
<td>N/S</td>
</tr>
<tr>
<td>Once a month or more/once in several months</td>
<td>50 (58.2)</td>
<td>39 (43.8)</td>
<td></td>
</tr>
<tr>
<td>Leakage amount</td>
<td>31 (47.7)</td>
<td>28 (47.5)</td>
<td>N/S</td>
</tr>
<tr>
<td>Few drops/small amount</td>
<td>34 (52.3)</td>
<td>31 (52.5)</td>
<td>N/S</td>
</tr>
<tr>
<td>Moderate amount/large amount</td>
<td>24 (36.4)</td>
<td>20 (33.3)</td>
<td>N/S</td>
</tr>
<tr>
<td>Annoyance</td>
<td>42 (63.6)</td>
<td>40 (66.7)</td>
<td>N/S</td>
</tr>
<tr>
<td>Not at all/seldom/sometime</td>
<td>50 (75.8)</td>
<td>36 (60)</td>
<td>N/S</td>
</tr>
<tr>
<td>Bladder emptiness</td>
<td>16 (24.2)</td>
<td>24 (40)</td>
<td>N/S</td>
</tr>
<tr>
<td>Yes</td>
<td>50 (75.8)</td>
<td>42 (71.2)</td>
<td>N/S</td>
</tr>
<tr>
<td>No</td>
<td>16 (24.2)</td>
<td>17 (28.8)</td>
<td>N/S</td>
</tr>
<tr>
<td>No-1 a night</td>
<td>48 (75.8)</td>
<td>40 (70.2)</td>
<td>N/S</td>
</tr>
<tr>
<td>Constipation</td>
<td>17 (27.0)</td>
<td>25 (44.8)</td>
<td>0.04</td>
</tr>
<tr>
<td>Flatus</td>
<td>46 (73.0)</td>
<td>31 (56.4)</td>
<td></td>
</tr>
</tbody>
</table>

$^a$ Difference between groups

**PFMT** = pelvic floor muscle training
Significant improvement in SF was demonstrated by the responses to specific PISQ-12 questions. The questions that achieved the highest significant improvement were: "Do you feel pain during sexual intercourse?" (Paula only: $P < 0.001$; PFMT, $P < 0.001$), with no significant difference between groups as can be seen in Figure 2.

There was a significant correlation between the mean SF score and the mean QoL score after the intervention (Paula: $r = 0.4$, $P = 0.002$; PFMT: $r = 0.4$, $P = 0.009$). A mild to moderate significant correlation was also found between the SF score and pad test results in both groups post intervention ($r = -0.3$, $P = 0.02$; $r = -0.3$, $P = 0.04$, respectively). Although a reduction in urinary leakage, as measured by the pad test, was reported in both groups, no significant correlation between the change in pad test results and the change in SF was observed.

In further analysis, the QoL was significantly associated with the degree of annoyance ($P < 0.0001$), pad test results ($P < 0.0001$), and SF ($P = 0.031$) while the intervention group was not significantly related. In a linear regression model, the quantity of urinary leakage predicted 19.9% of the QoL, with annoyance predicting 14.8%, and the SF score, 6.7%, with no significant effect of the intervention group (0.5%).

Age and estrogen status were significantly correlated in both groups ($P = < 0.0001$). Estrogen status was found to affect women's SF only after the intervention. Women with endogenous or exogenous estrogens had higher SF scores (39.8 [4.8] in the Paula group, 39.3 [5.8] in the PFMT group) while postmenopausal women with no estrogen therapy had lower SF scores (Paula: 34.6 [5.1], $P = 0.001$; PFMT: 35.2 [4.9], $P = 0.01$), with no significant difference between groups.

Women with MIX (SUI + URI) had a lower SF score than those with only SUI, in both groups. In a variance model, the interaction between urge incontinence and pad test was found to have a significant effect on the SF score ($P = 0.04$) when the clinical pad test ($P = 0.002$), URI ($P = 0.007$), and the type of intervention group ($P = 0.28$) were included.

**Discussion**

This RCT demonstrated that both the Paula method and PFMT were associated with improve-
ment of SF and QoL of women with SUI. This was accompanied by a significant decrease in urinary leakage, demonstrated by the pad test results and self-report after the interventions [4]. These findings strengthen the literature that supports exercise interventions as first-line conservative management techniques for women with UI (SUI or MIX) [2,12]. Our study adds a new dimension to the pioneering RCT study of Bo et al. [19], which demonstrated improvement in sexual problems and QoL in women randomized to PFMT and an untreated control group although there are non-RCT studies that have contrary results [24]. It is important to note that Garbourg's [16] study used different assessment tools with an intervention that was 6 months in length, using a smaller population with a higher mean urinary leakage than our study population. The current study is the first to examine changes of SF and QoL before and after a relatively newly evaluated

![Figure 2](image)

**Figure 2** The SF difference before and after the intervention, in both groups. SF = sexual function; PFMT = pelvic floor muscle training

| Table 4 | SF questions and each score (Mean [SD] by PISQ-12), before and after the intervention within group |
| Questions | **Paula Mean (SD)** | **PFMT Mean (SD)** |
| | Before | After | Before | After | Before | After | **P** |
| 1. How frequently do you feel sexual desire? | 2.2 (0.8) | 2.2 (0.9) | N/S | 2.2 (0.7) | 2.2 (0.8) | N/S |
| 2. Do you climax when having sexual intercourse with your partner? | 2.7 (1.1) | 2.8 (0.9) | N/S | 2.6 (1.1) | 2.8 (1.0) | N/S |
| 3. Do you feel sexually excited when having sexual activity with your partner? | 2.9 (1.0) | 3.0 (0.9) | N/S | 3.1 (0.9) | 3.0 (0.8) | N/S |
| 4. How satisfied are you with the variety of sexual activities in your current sex life? | 2.7 (1.0) | 2.8 (1.0) | N/S | 2.7 (0.9) | 2.7 (0.9) | N/S |
| 5. Do you feel pain during sexual intercourse? | 3.1 (0.9) | 3.3 (0.8) | 0.005 | 2.9 (1.1) | 3.0 (1.1) | N/S |
| 6. Are you incontinent of urine with sexual activity? | 3.4 (0.8) | 3.6 (0.6) | 0.002 | 3.3 (0.8) | 3.6 (0.7) | 0.002 |
| 7. Does fear of incontinence restrict your sexual activity? | 3.5 (0.9) | 3.7 (0.6) | 0.003 | 3.4 (0.9) | 3.6 (0.7) | N/S |
| 8. Do you avoid sexual intercourse because of bulging in the vagina? | 3.7 (0.7) | 3.9 (0.4) | N/S | 3.8 (0.7) | 3.7 (0.7) | N/S |
| 9. When you have sex with your partner, do you have negative emotional reactions? | 3.8 (0.6) | 3.8 (0.5) | N/S | 3.6 (0.9) | 3.6 (0.9) | N/S |
| 10. Does your partner have a problem with erections that affects your sexual activity? | 3.4 (1.0) | 3.6 (1.0) | N/S | 3.3 (1.0) | 3.4 (1.0) | N/S |
| 11. Does your partner have a problem with premature ejaculation that affects your sexual activity? | 3.3 (0.9) | 3.5 (0.7) | N/S | 3.5 (0.9) | 3.6 (0.8) | N/S |
| 12. Compared with the past, what is the frequency that you have orgasm in the past half year? | 2.5 (1.2) | 2.5 (1.2) | N/S | 2.6 (1.1) | 2.5 (1.0) | N/S |

*P - within group
SF = sexual function; SD = standard deviation; PISQ-12 = Pelvic Organ Prolapse/Urinary Incontinence Sexual Questionnaire; PFMT = pelvic floor muscle training

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exercise intervention (Paula method) in comparison with PFMT, for women with SUI.

Apart from the significant improvement in overall SF, it is noteworthy to examine the responses to specific PISQ-12 questions in our study population. There was a decrease in the frequency of incontinence during sexual activity and a decrease in the restriction of sexual activity. These changes can be attributed to objective improvements in SUI when considering the fact that both groups showed significant correlation between the SF score and pad test results after the exercise interventions, similar to the literature [25]. Women with MIX (SUI + URI) had a lower SF score than those with only SUI, in both groups. It needs to be noted that the "mixed incontinence" description was reached by subjective report and not by urodynamically testing therefore these results need to be cautiously considered.

Age was found to be a main predictor of SF, more than the pad test results, in both groups. Age and estrogen status have been reported to have a negative correlation with SF [5]. Women with either endogenous or exogenous estrogens in our study, had a greater SF score compared with those with no estrogens post intervention. The literature on female sexuality and aging in general notes that hormonal status might influence sexuality in post-menopausal women [26]. Our sample may be similar to women in the general population. Gordon et al. also found that women receiving hormonal therapy had significantly higher SF scores, compared with women with no hormonal support [27]. It is unclear whether older women’s SF scores are affected by estrogen status alone or the fact that as they get older their partners get older and they begin to suffer from chronic disease or sexual dysfunction. It is important to note that there are studies that show no significant association between age, menopausal status or hysterectomy status (possible proxies for hormonal status), and sexual distress, a variable related to sexual functioning [28]. This issue is somewhat irrelevant in our study since the inclusion criteria required that the women have a partner, though we do not have data on the health of that partner.

Participants in the Paula group reported a reduction in dyspareunia. Improvement in pain and lubrication after PFMT has been discussed in the literature. Zahariou et al. has postulated that when urine leakage pools in the vaginal vault there may be a possible change in vaginal acidity. This change may alter the vaginal flora leading to dryness, which can contribute to vaginal pain [29]. One could speculate that pelvic floor exercises increase blood flow to the vaginal area allowing for more flexibility and potential lubrication.

Both intervention groups had reduction in the amount of urinary leakage. However, only the Paula group had a significant decrease in “fear of incontinence” during sexual activity and pain during sexual intercourse. It can be suggested that though any exercise which affects the pelvic floor can bring about improvement in leakage, the Paula exercise group reported a concurrent reduction in fear and pain. This finding supports the literature on sexual behavior which reports that a more relaxed pelvic floor, one where there is no tension due to fear, may contribute to less pain during sexual intercourse [25,30,31]. We cannot determine from the present study the source of this improvement. It may have occurred because the Paula method is a full body workout that besides improving muscle flexibility as a result of exercising, may affect a person’s overall mood. Exercise has been documented to improve overall mood, creating an environment of positivism and motivation [29,32]. An additional explanation may be that the intervention allowed for a “one on one” extensive opportunity for advisement and exercise and therefore the women felt supported.

Urinary leakage has been reported to cause social isolation and a lack of communication about its effects, decreasing self confidence and possibly contributing to depression [33]. The study interventions allowed for open discussion of these challenges with the exercise instructors and may have inspired more open communication between the partners as well, allowing for expression and sharing of the effects of the women’s urinary leakage on both partners. This in and of itself may have influenced the women’s perspective of their leakage challenge. The relationship between the Paula method of exercise and the reduction in sexual fear and pain deserves further study under RCT conditions.

We found significant correlations between pad test results and SF before the intervention. The actual change in leakage itself before and after the interventions was also correlated. We may assume that the SF score improvement is due to several reasons and not only as a direct result of the mean urinary leakage. One of the issues could have been “reporting bias.” Approximately half of the women had not consulted about their leakage problem with a physician prior to the trial. For some of the women this was the first time they had ever shared their urinary leakage issues with a health profes-
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sional. After 3 months of focused exercises, women might have been more comfortable to report details about their leakage, making them more precise about their description of the issues and their implications.

It cannot be overemphasized that SF and sexual satisfaction are multifactorial. Sexual distress in women with UI has been reported as related to other personal and relationship factors as well as increase pelvic muscle strength in and of itself sufficient to improve sexual functioning [24,28]. The mechanisms for improved SF for women with SUI following these interventions can only be speculative at this juncture. One possibility is that the improvement was due to muscular changes as a result of the interventions. In general, pelvic floor muscle contractions are part of the arousal and orgasmic experience. It has been suggested that the strengthening of the pelvic floor muscles may shift the clitoral anatomic positioning allowing for more efficient clitoral stimulation, though this has not been observed empirically [29,34]. In addition, a decrease in fear of urinary leakage for women with SUI may have provided an opportunity to focus on pleasure and concentrate on sexual experiences. When reviewing the effects of exercise on mental and physical health, it was reported that participants who took part in RCT studies of physical activity interventions displayed better general health outcomes, QoL, functional capacity, and mood states [35]. It is known that regular exercise builds self-esteem, and better self-esteem is a correlate with higher SF as well [36,37].

We found, as expected, a significant correlation between SF and QoL [38] before and after the intervention with slightly greater statistical significance after the intervention. This finding is similar to the correlation between SF and QoL found in women with UI treated with other noninvasive techniques such as biofeedback, electrical stimulation, and vaginal cones [39]. In considering these results we need to be aware that there is evidence that SF is part of QoL, with the QoL instrument used in this study including a specific question regarding SF ("I worry about having sex because of my urinary problems or incontinence") which may have affected the instrument outcome.

The "annoyance degree" of the urinary leakage after the intervention (how much does the incontinence bother you) and the pad test results had a significant relationship with the QoL across interventions. Here too, the QoL questionnaire contained specific questions, "I worry about others smelling urine on me," "My urinary problems or incontinence is always on my mind" with similar possible influence on the outcomes as above. It is not surprising to find the association between "annoyance degree" and the SF score in both groups. Lower QoL has also been found to correlate with SUI annoyance symptoms [40].

Limitations

This study has a number of limitations. Firstly, the sample that was studied did not include women who are in same gender relationships or were without a partner but still sexually active. The PISQ-12 is also geared toward heterosexual relationships, a documented limitation of the instrument [41]. Previous experience with either of the exercise modalities though possibly influencing their exercise competency was not examined or presented as an exclusion criteria in that the women were suffering from SUI at the time of the study. In addition, after the intervention, some of the participants did not present for the post-intervention physical evaluation. Though there was a change in the post-intervention sample size, this "drop out" group (see Figure 1) did not differ significantly from the study groups. Outcomes may have been influenced by the different exercise protocols, with Paula exercises given in individual training sessions and PFMT being provided in group work.

Implications

It would be beneficial to perform a longitudinal study on women with SUI, to assess the efficacy of the interventions and their long-term affects on SF and QoL. In addition, this study offers two intervention methods for women with urinary leakage due to SUI. There is a need for a cohort study for assessing those methods as an SUI preventive intervention with the inclusion of young continent women. Ultimately, the time frame of each of the protocols needs to be studied in order to eliminate the "one on one" effect of the Paula protocol vs. the PFMT protocol. It may be necessary to conduct the timing of both the Paula method and the PFMT similarly, with individual or group sessions. In terms of professional health practice, there is a need to encourage primary healthcare providers as well as specialists to assess for urinary leakage and to include the issues of sexuality and QoL in their intake and discharge teaching [22], considering that this condition affects one of every four women [1]. Ultimately, a multidisciplinary approach in both assessment and intervention is recommended [41]. The Paula method exercises could be considered as part of the list of conservative treatments for

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women with SUI in order to promote women's health with simple, noninvasive, and relatively inexpensive interventions. Details of the Paula method exercises are found in the literature [3,4,16].

Summary

This RCT study demonstrated the effectiveness of two exercise methods on SF and QoL in women suffering from SUI, adding important information to the limited knowledge of exercise as an effective treatment. These findings offer a unique perspective on SF for this population of women. It also enhances the literature that supports exercise interventions as a first-line conservative management technique for women with UI and sexual dysfunction, while presenting the Paula method for consideration as well.

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References


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