

THERAPEUTIC MASSAGE IN WOMEN WITH STRESS URINARY INCONTINENCE: A PILOT STUDY

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ABSTRACT

Background: Stress incontinence affects 25–60% of women of all ages and causes constant discomfort, significantly lowering quality of life. The most common causes of urinary incontinence are weakened sphincter muscles or bladder failure.

Aim of the study: The aim of this study was to assess the effectiveness of therapeutic massage therapy for stress urinary incontinence and to determine whether therapeutic massage can restore the normal function of the bladder sphincters.

Material and methods: The study involved eleven women with a diagnosis of primary stress urinary incontinence, aged 50–79 years. The women attended therapeutic massage sessions twice a week for four weeks. A sanitary pad test was performed before starting and immediately after ending the therapy to verify its effectiveness.

Results: In eight women, the amount of urine that leaked decreased after therapy. This result was statistically significant ($p = 0.02$). In three cases, urine leakage was reduced to zero.

Conclusions: Therapeutic massage, acting locally, improves the function of the bladder sphincters, their flexibility and the ability to contract and relax. Massage eliminates or significantly reduces the symptoms of stress urinary incontinence.

KEYWORDS: stress urinary incontinence, therapeutic massage, physiotherapy, women

BACKGROUND

Urinary incontinence (UI) can be classified as stress urinary incontinence (SUI), urgency urinary in-

continence (UUI), mixed urinary incontinence (MUI), and overflow urinary incontinence (OUI), depending on the circumstances under which the incontinence occurs [1]. The first type is associated with physical

effort; the second with a strong, sudden need to urinate and an overactive bladder (OAB); the third is a combination of these two; and the fourth is caused by incomplete emptying of the bladder, resulting in a spillover of small amounts of urine [2-4].

Stress urinary incontinence is involuntary urine leakage during various activities and movements, such as coughing, sneezing, jumping, heavy lifting, and exercising [1,5]. It is mainly caused by the weakening of the pelvic floor muscles (PFM) or the urethral sphincter muscles [5].

Involuntary urine leakage occurs when the pressure inside the bladder is higher than the intraperitoneal pressure without a simultaneous detrusor muscle spasm. Increased pressure in the bladder is associated with the elevation of intra-abdominal pressure, caused by physical effort and other factors [6, 7]. There are three stages of stress urinary incontinence:

- stage I: urinary incontinence occurs when the intra-abdominal pressure (IAP) substantially and suddenly increases, as during laughing, coughing, and sneezing;

- stage II: urine constantly leaks during physical effort associated with tensing the abdominal muscles (for example, climbing stairs with a load),

- stage III: urinary incontinence occurs even when lying, when abdominal pressure only slightly increases - for example, when changing position from one side to the other [3].

Although urinary incontinence mostly affects women (25%–60% of the female population) over a broad age range of 25–65 years [7-9] it is also observed in men of different ages, and is sometimes estimated as affecting as many as 39% of the male population [10]. The incidence of urinary incontinence rises with age, and advanced age is when it reaches its peak incidence. Urinary incontinence is a problem young women suffer from, usually after giving birth [11]. The pathophysiology underlying this health condition results from two mechanisms: excessive mobility of the urethra (urethral hypermobility) and of the bladder neck, as well as weakening, dysfunction, and failure of the sphincter and overactivity of the detrusor muscle [6-7,10]. Risk factors for urinary incontinence include obesity and overweight, past pregnancy, the use of stimulants (e.g., cigarettes), a history of surgery of the pelvis and perineum, and anatomical dysfunctions. Ethnic origin, hormone replacement therapy, and impairment of motor and cognitive function are also mentioned as potential contributors to the problem [5].

In the case of the dysfunction discussed here, it is essential to diagnose and precisely define the nature of urinary incontinence - to establish whether it is a chronic or transitory form, how severe it is, and whether other diseases that potentially cause urine

leakage (for example, prolapse of the pelvis or fistula) have been excluded [12]. Correct diagnosis enables quick intervention tailored to the needs of the patient. Taking appropriate therapeutic measures early also depends on the patient. It often happens that women do not report the problem of urinary incontinence to the doctor because of feelings of shame or embarrassment. This makes quick and accurate diagnosis difficult, and early therapy is practically impossible. It is thus extremely important to raise awareness throughout society of the necessity of reporting symptoms of urinary incontinence, especially as this symptom causes constant discomfort and the need to protect oneself (using sanitary pads), which has a negative impact on the quality of women's lives in all spheres: physical, social, sexual, and psychological [2,11,13-14]. There are many treatment methods, both conservative and surgical, for stress urinary incontinence, and these are continuously undergoing modification and refinement. Among them are pharmacotherapy, physiotherapy, and surgery. Pharmacotherapy aims to improve urine outflow and, at the same time, inhibit detrusor overactivity [10,15]. Rehabilitation includes daily personal hygiene, lifestyle modification, strengthening exercises for the pelvic floor muscles (SEPFM), activity of the pelvic floor muscles, pelvic floor muscle training (PFMT), controlled tension of the transverse abdominal muscle (TrA), superficial electrical stimulation (IES), intravaginal electrical stimulation, biofeedback (BFB), intravaginal laser therapy, and magnetic field therapy [3,13-14,16-19]. The possibility of using massage in urinary incontinence has long been written [20-21]. The possibility of using massage in urinary incontinence has been reported before [20-23].

Two studies demonstrated that massage was an effective therapy in women with stress incontinence. The presented massage procedure had a positive effect on the amount of urinary leakage on effort immediately after the therapy and a few-month follow-up therapy produced complete relief from the distress [24-25].

Surgical treatments for stress urinary incontinence include filling substances, the construction of a supportive sling, onabotulinum toxin A, implantation of tension-free vaginal tapes (TVT), diaphragms, neuromodulators, and special supporting sutures [3,5,26-27]. Surgical treatment is only recommended if the conservative treatment has had no therapeutic effect [8,11].

The main purpose of physiotherapy is to improve muscle endurance, to alleviate urinary incontinence and, above all, to improve quality of life. Regularity, repetitiveness, long-term use of particular methods, as well as specialist equipment and a qualified therapist are indispensable, regardless of the type of therapeutic method. The broad range of methods for

dealing with urinary incontinence shows that there is no uniquely effective treatment. Among the very important, or even crucial elements are patient cooperation, modification of lifestyle (avoiding addictive substances, weight loss, a well-balanced diet, appropriate fluid intake), habits associated with urinating, and consistent behavior [12].

AIM OF THE STUDY

The aim of this study was to assess the effectiveness of therapeutic massage therapy for stress urinary incontinence

MATERIAL AND METHODS

Settings

The research was conducted at the Faculty of Physiotherapy, the University of Physical Education in Wrocław, where the participants were referred to by primary care physicians. The cooperation between the doctor and the physiotherapist was carried out under a partnership agreement concluded between the Primary Healthcare Center and the university.

Participants

The study involved eleven women with a diagnosis of primary stress urinary incontinence, qualified by a family practitioner on the basis of the inclusion and exclusion criteria (Table 1)

Table 1. Inclusion and exclusion criteria for research

Inclusion criteria for research	Exclusion criteria for research
Stress Urinary Incontinence I stage	Stress Urinary Incontinence II and III stage
Age ≥ 50 years	Age > 80 years
No participation in other therapy (currently)	Urgency Urinary Incontinence (UUI)
No abdominal surgery	Mixed Urinary Incontinence (MUI)
Cancer diseases of internal organs treated 5 years ago	Currently treated cancer diseases of internal organs
	Abdominal tumors

The women were aged between 50 and 79. The mean values for the basic morphological characteristics of the study group are presented in Table 2. Prior to entering the therapy, the women had not used any other therapeutic methods. They had been struggling with urinary incontinence for periods of times

ranging from several months to several years. None of the patients had previously reported the problem to a family practitioner. The women had previously only protected themselves with sanitary pads and by avoiding factors that could provoke urine leakage, such as physical effort, stress, and urgent situations requiring sudden physical effort for example, running to a bus or tram stop. The International Physical Activity Questionnaire (IPAQ) – a standardized self-report measure of physical activity – was not used in this study, but we did determine that the patients had not systematically practiced any form of physical activity. We calculated the body mass index (BMI) of our patients (Table 2) and the average of the group indicated overweight, only three participants had their BMI > 30 kg/m² which qualifies them as obese.

Table 2. Characteristics of the study group

Study group	Age M \pm SD	Weight [kg] M \pm SD	Height [cm] M \pm SD	BMI [kg/m ²] M \pm SD
N=11	64 \pm 10.7	71 \pm 12.04	160 \pm 3.81	27 \pm 4.39

The patients emphasized that their need to avoid physical activity, as well as social and intimate life, had contributed to a significant decline in the quality of their lives.

Study design

Methodology of massage

Massage was performed twice a week over a period of four weeks, with each session lasting 20 minutes. 40 minutes before each massage, the women drank half a liter of mineral still water in order to fill the bladder. Next, they adopted a position lying on their back with a roll under the head to relax the sternocleidomastoid muscle, and with wedges placed under the shoulder girdles to relax the superficial muscles of the chest. Wedges were placed under lower limbs along the shanks to help raise the lower limbs to obtain bending in the hip and knee joints. The above position permits normalization of the tension of the iliopsoas and abdominal wall muscles. The massage consisted of three stages:

The initial stage involved superficial stroking of the abdominal wall with a brush (Fig. 1).

Next, deep stroking was performed along the blood vessels from the umbilicus to the saphenous opening and the groin (Fig. 2).

In the next step, stroking and friction (rubbing) of the pyramidalis muscle from the umbilicus towards inguinal pits was performed, kneading indirectly through the straight abdominal muscle. At the end of this stage, we kneaded along the abdominal oblique



Figure 1. Superficial stroking of the abdominal wall

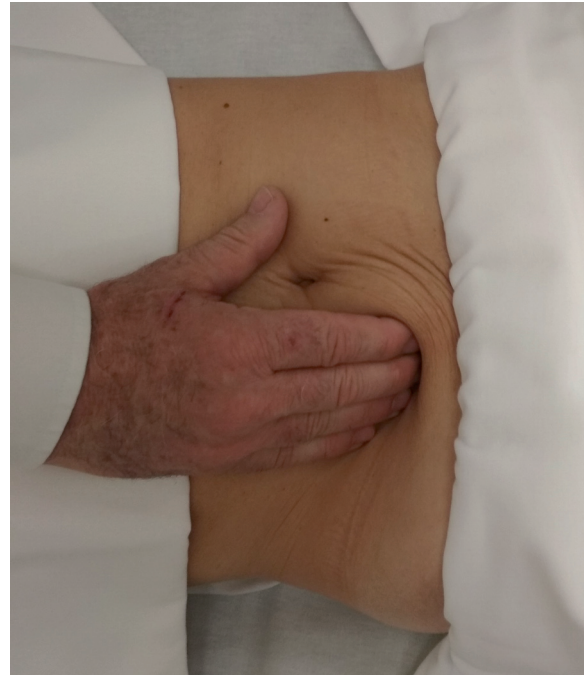


Figure 2. Deep stroking towards the saphenous opening with the palm

muscles. The number of repetitions for each technique was 7–8 movements. Several stroking movements the abdominal skin were always made before moving onto the next techniques. The purpose of this method was to normalize the tension of the arrector pili (AP) muscles in the area of the skin innervated by the genitofemoral nerve and the lateral femoral cutaneous nerve, to increase venous blood outflow from the superficial epigastric vein, and to normalize tension of the pyramidalis and abdominal wall muscles.

In the main part, the linea alba was slowly pulled from the pubic symphysis towards the umbilicus using four fingers. This movement was intended to produce modulated tension of the umbilical ligaments which fix the bladder to the linea alba (Fig. 3).

This approach resulted in a slight deformation of the filled bladder wall, causing a gradually increasing urge to urinate. The task of the patient during this

movement was to signal the urge to urinate, and to focus on not allowing micturition. At that time, the stimulation (pulling the linea alba) was stopped until the urge to urinate had subsided. This activity was repeated five times.

In the final stage, superficial stroking of the lower part of the abdomen was used to reduce neuromuscular tension (Fig. 4).

Data sources/measurement

A sanitary pad test – recommended by the International Continence Society (ICS) to estimate the amount of urine leaking out during physical effort – was performed before the first massage session and after the whole series of massages. The pad test methodology is as follows: women drink 500 ml



Figure 3. Pulling the linea alba



Figure 4. Final superficial stroking

water before exercise, after drinking water, women resting for 15 minutes. After resting, they do exercises for 30 minutes, including: walking (2 × the length of the corridor), climbing up and down one flight of stairs (4 ×), standing-up from sitting (10 ×), coughing vigorously (10 ×), running on the spot for 1 minute, bending to pick up an object from the floor (5 ×) and washing hands for 1 minute in running water [28].

The test provides information about the severity of the patient's baseline urine leakage, and shows the difference in the results before and after a series of massages. The sanitary pad is weighed before and immediately after effort. The results are interpreted as follows: an increase in the weight of the sanitary pad after effort of less than 1 g is taken as representing dryness; an increase of 1–10 g means slight involuntary urine leakage; an increase of 11–50 g means heavy urine leakage; and an increase of >50 g is very heavy urine leakage [3,28]. The sanitary pads were weighed using an electronic scale. The amount of urine was given in grams.

Statistical analysis

Statistical analysis was performed using Statistica 9. The results of sanitary pad tests before and after therapy were compared using the Wilcoxon signed rank test (nonparametric test for dependent groups). This test was used due to the small size of the experimental group and the nonnormal variable distribution, as assessed by the Shapiro–Wilk test. Statistical significance was set at $p < 0.05$.

RESULTS

Descriptive data

Comparison of the sanitary pad test results obtained before starting and immediately after ending the therapy demonstrated statistically significant changes. The mean amount of leaked urine in the entire study sample before therapy was 2.25 g (SD±0.69 g). After four weeks of the therapy, the amount of urine had reduced to 1.23 g (SD±1.40 g).

It must be emphasized that before entering the therapy, the smallest amount of urine leaked in a sanitary pad test was 0.77 g; this was recorded in one patient. The greatest amount of urine was 2.80 g, also observed in one patient.

After the therapy a statistically significant ($p=0.02$) decrease in the amount of urine leaked was noted in eight women, in three of whom it was reduced to zero. In other three, this parameter did not change.

Discussion

Key results

Therapeutic massage improves the functioning of bladder sphincters, it makes them more flexible, improving their contraction and relaxation.

Massage eliminates or significantly reduces the symptoms of stress urinary incontinence.

The elimination of symptoms of stress urinary incontinence could lead to improvement in the quality of life and could enable taking up physical activity.

Interpretation

It has recently been recommended in the physiotherapeutic management of stress urinary incontinence to combine therapies, such as biofeedback with pelvic floor muscle training, biofeedback with simultaneous tension of the transverse abdominal muscle, or manual nerve and muscle therapy with mechanical and acoustic vibrations. The methods are then more effective than when they are applied alone [13-14,26,29-30].

Moreover, it is increasingly frequently emphasized that patients need to be educated on micturitional habits, personal hygiene, and elements of self-therapy that can help to maintain therapeutic effects. One study demonstrated that pelvic floor muscle training performed in the outpatient clinic in the presence of a therapist was more effective than training done by the patient herself at home. Nevertheless, the authors of this study underlined the fact that self-reported satisfaction with therapy, quality of life, and functioning in everyday life – taking into account the number of urine leakage episodes – were similar in both groups [31]. This shows the need for different forms of self-therapy: even if physical symptoms subside more slowly, patients' mental well-being will be better, and that is what contributes to their quality of life.

Noninvasive and minimally invasive treatment methods are desirable. There are many effective ways of treating urinary incontinence, such as electrostimulation, laser, and biofeedback therapy, which however require specialist equipment and qualified staff if they are to be used, not mentioning the surgical procedures. Conservative treatment methods are safe, much cheaper than surgery, and highly effective, but they do require patients' involvement and cooperation, as well as longer continuance than surgical methods.

The small number of reports describing the use of massage in stress urinary incontinence motivated us to undertake research into this issue. The use of manual massage can be a valuable complement to therapy

and a therapeutic tool in the treatment of unpleasant ailments.

During massage of the abdomen and indirectly of the bladder, local congestion of the body occurs. Histamine is released from mastocytes, causing vasodilation. The bladder becomes better nourished and more oxygenated, which speeds up the regeneration of muscle cells. These processes make the muscles more flexible, improving their firmness and ability to contract and relax [32-33]. Massage improves the functioning of the abdominal wall auxiliary muscles, which carry the viscera and support the pelvic floor, thus improving the work of the bladder [32]. The bladder consists of smooth muscles, connective tissue, and the network of blood vessels, owing to which we can indirectly affect its structure using various massage techniques. Thus, local and indirect manipulation of the bladder improves the functioning of the sphincter muscles [33]. Massage normalizes the tension of the ligament apparatus and restores the normal distribution of the venous blood and lymph in the bladder area, which explains how the function of the bladder improved after massage therapy in the group of the women.

Massage could serve as a supplementary method in the treatment of stress urinary incontinence – a method that is noninvasive, safe, easy to repeat, and comfortable for the patient. Nonetheless, a positive therapeutic outcome depends on the severity and duration of the disease, as well as on body weight and BMI (the higher these are, the more difficult the process of rehabilitation). This form of therapy is recommended alongside other methods used as part of conservative treatment for urinary incontinence, but requires further research with a greater number of patients (including men) [1]. The massage methodology is simple, easy to repeat, and can be performed not only by massage therapists and physiotherapists, but also community nurses and medical staff employed in nursing homes.

This therapy should not be thought of as applicable exclusively to the aged and elderly. There are a growing number of comprehensive programs of care and rehabilitation for young women to prevent, for example, postpartum stress urinary incontinence [34]. Work is also ongoing on modern conservative treatment strategies and their implementation in

clinical practice [35]. This requires the collaboration and integration of practice of medical professionals and physiotherapists, but allows for therapy that would be tailored to individual needs and oriented toward long-lasting therapeutic effects.

CONCLUSIONS

The authors' observations show that manual massage, acting locally, improved the function of the bladder sphincters, their flexibility and the ability to contract and relax. In the study group, in some patients, the use of massage contributed to the remission or significant reduction of incontinence symptoms in the case of their moderate intensity. Therapeutic massage can be a valuable complement to the conservative treatment of stress urinary incontinence. However, the use of massage as a therapeutic method for stress urinary incontinence requires further research in more participants.

Limitations

The main limitation of this study was the small size of the group that underwent massage therapy. There was also no control group which makes it impossible to compare the study and control group and only allows the presentation of data about the study group.

We did not use questionnaires concerning physical activity or quality of life; obtaining this information would allow for a more accurate description of the participants and more in-depth analysis of the subject and factors predisposing to urinary stress incontinence. We plan to use such questionnaires in our further investigation, to expand the size of the study sample, and to compare results to those achieved in the control group.

Declarations

Registration: The project titled "Using massage in stress urinary incontinence (SUI)" was approved by our university's Bioethical Committee (no. 3/2018).

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