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Effectiveness Of Laser Acupuncture And Pelvic Floor Training On Stress Urinary Incontinence In Obese Postmenopausal Women

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Abstract

Background. Stress urinary incontinence (SUI) is a condition that happens in around 20-30% of young females, 30-40% in middle age, and up to half of females in old age; thus, it is a significant social issue that influences over half of postmenopausal women.

Objective This study was directed to determine the effectiveness of laser acupuncture and pelvic floor training on stress urinary incontinence in obese postmenopausal women.

Participants and methods Forty obese postmenopausal women were suffered from mild to moderate stress urinary incontinence; their ages ranged from 50-65 years old, and their body mass index (BMI) ≥ 30 ≤ 40 Kg/m^2. They separated randomly into two equivalent gatherings. The study group (A) received laser acupuncture therapy and pelvic floor training for 30 min every other day for 12 sessions (3 times per week). While the control group (B) maintained their standard medical treatment. All participants have assessedthe pelvic floor muscles strength by using Modified oxford grading scale (MOGS)and perineometer before starting intervention and at the end of the 12^{th} session.

Results. There was a highly significant improvement in pelvic floor muscle strength assessed with (MOGS) after treatment in the study group (A)P<0.0001and significant improvement in the control group (B) P<0.01.While There was a highly significant improvement in pelvic floor muscle strength assessed with perineometerafter treatment in the study group (A)P<0.0001 andnon-significance improvement in the control group (B) P<0.716Also, there was a highly significant difference between groups concerning pelvic floor muscle strength favoring the study group (A) P<0.0001.

Conclusion. Laser acupuncture and pelvic floor training are effective methods in treating stress urinary incontinence in obese postmenopausal women.

Keywords:laser acupuncture,pelvic floor training, stress urinary incontinence, obese postmenopausalwomen.

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Introduction

Menopause is the most significant period in a woman's life and brings in many physiological changes that affect life permanently. There have been many opinions about the symptoms that appear before, during, and after the onset of menopause [1].Menopause is associated with weight gain, as well as an increase in hypertension and diabetes. Estrogen deficiency can cause hormonal changes that contribute to the development of osteoporosis. Menopause is marked by hot flushes, sweating (especially at night), irritability, concentration issues, joint pain, vaginal dryness, and urogenital disorders (high rate of incontinence)[2].

Postmenopausal women are at danger for urogynecology dysfunction, incontinence, prolapse, and sexual dysfunction as circulating estrogen levels decrease with age. Their signs and symptoms may have a significant impact on one's satisfaction. Menopause occurs at an average age of 51 years in women, with most women experiencing it between 45 and 55. As a result, women should expect to live for another 30 years after menopause [3].

SUI affects 20-30% of young women, 30-40% of moderately aged women, and up to half of the women in their later years, making it a major social issue that influences the more significant part of postmenopausal women. This issue significantly influences the personal satisfaction of influenced women [2]. Also, urinary incontinence may affect the functional ability of elderly females [4]

Stress urinary incontinence is the most widespread type of incontinence (SUI). According to a study, SUI is often associated with conditions that cause high intra-abdominal pressure, for example, pregnancy with or without vaginal conveyance, obesity, and strenuous physical work. The urogenital tract and pelvic floor contain estrogen and progesterone receptors. This may mean that these hormones play a role in incontinence. Estrogen does increase urethral closure pressure, possibly due to increased blood flow. Estrogen has also been shown to improve the epithelia in the vagina, urethra, and bladder wall in postmenopausal women.As a result, it is reasonable to assume that using postmenopausal hormone therapy (HT) would reduce the risk of SUI [5].

The most well-known and potentially modifiable danger factor for the advancement of UI is obesity. In some studies, a positive connection between UI and body mass index (BMI) has effectively been created. Weight has a direct dose effect on incontinence, with every 5-unit expansion in BMI raising the risk of incontinence by 20 to 70%. Moreover, compared to ordinary-weight patients, obese patients have about double the risk of presenting with UI. Increased intra-abdominal pressure and constant tension on tendons and nerves can bother or cause pelvic floor problems by causing excessive stretching [6].According to the prevailing unifying theory, the increased intra-abdominal pressure (IAP) caused by obesity stresses the pelvic floor and leads to the growth of SUI[7].

Changes in one's lifestyle can help with simple stress incontinence. Weight loss, fluid restriction, expected voiding, Kegel muscle preparation, and biofeedback are the modifications. In addition, there is a group of incontinence schemes that can be used [8].Timed voiding aims to keep the bladder from being too full. Exercises to strengthen the pelvic floor muscles can aid older women with urinary incontinence [4].

Although there are many ways to treat urinary incontinence, such as drug treatment and surgical intervention, physical therapy is one of the most successful and best treatment methods used with patients with urinary incontinence; this method is the best treatment method that helps patients strengthen the pelvic muscles and get rid of urinary incontinence [9].

Incontinence is often treated with pelvic floor exercise (Kegel's Exercise). It consists of repeated contractions of the pelvic floor muscles, especially the pubococcygeus muscle, to strengthen the muscles and improve micturition control [10].Pelvic floor exercises, including how to do a Kegel press, can be shown to the patient. When contracting the muscles used to avoid the outflow of urine or flatus, keep the stomach and thighs relaxed [11].In addition to laser treatment has a major role in the treatment of many cases [9].

Low-intensity laser therapy (LILT) is a type of phototherapy utilized for many conditions, including musculoskeletal and delicate tissue wounds and persistent ulceration. Such lasers are additionally prescribed as a successful choice to metal needles for the incitement of acupuncture or musculoskeletal trigger focus. This type of treatment is ordinarily named "Laser Acupuncture" to recognize it from such laser gadgets' more extensive restorative utilization[12].

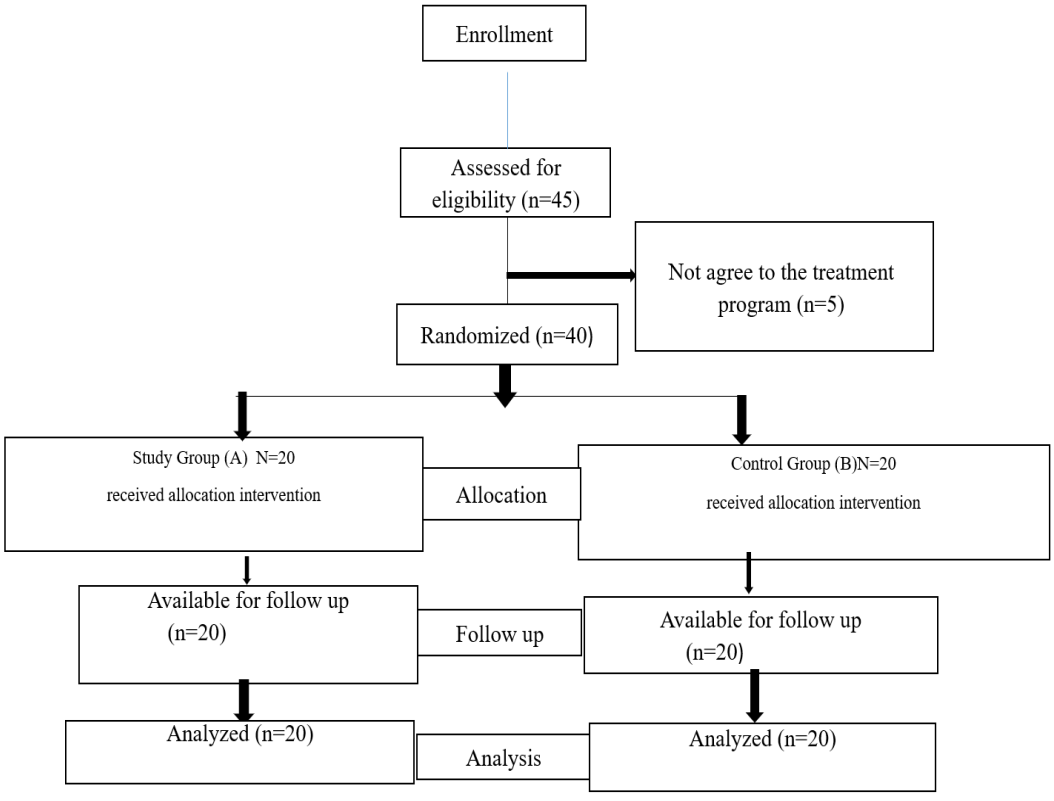
Laser acupuncture is essentially safer than needle acupuncture because of the non-intrusive nature of treatment (for example, in instances of disease) and a more suitable technique for the incitement of rugged points, for example, auricular acupuncture points or points around the perineum or privates (e.g., for sexual dysfunction) [12]. The lumbosacral area of the body may be treated with laser acupuncture to mimic pelvic floor muscles. Laser acupuncture can stimulate the posterior S1 via BL31, S2 via BL32, S3 via BL33, S4 via BL34, and the pudendal nerve via BL35 at the lumbosacral area. These techniques are effective in treating SUI. As a result, laser acupuncture can aid in reinnervation and strengthening pelvic floor muscles, thereby alleviating SUI symptoms [13].

Participants and methods

Participants

A randomized control trial on a sample of forty obese postmenopausal women with mild to moderate stress urinary incontinence was referred to the physical therapy outpatient clinic by the obstetrician at the outpatient

clinic of obstetrics at King Khaled Hospital in Tabuk. Their age ranged from 50 to 65 years old, as the mean±SD for the study group(A) was 56.40 ± 4.16 years and for control group(B) was58.10 ± 4.00 years, and their body mass index (BMI) was between 30 and 40 kg /m^2, as the mean±SD for the study group (A) was 33.80 ± 2.90) Kg/m^2 and for the control group, B was34.67 ± 2.698 Kg/m^2.Participants were screened for other pathological conditions. Exclusion criteria of the study were as follows neuromuscular disorders, Lumbar disc prolapse, gynecologicaldisorders, pacemakers, tumors, dermatological conditions, and the patient who takes anticoagulant agents. No symptoms were seen in any of the participants during the treatment programs. Overall, five participants who did not agree to the treatment program were excluded from the analysis. The five participants were three from the study group and two from the control group.A diagram of a flow chart of the study is shown in Fig. 1. The Ethical Committeeapproved this stud (Ref. Letter No. FMRS-EC2020-02-008)and the Clinical trial registration in Clinicaltrial.gov with an identifier number NCT04959084. The study protocol was explained to all the women, who then signed an informed consent form, duration of the study from (October 2020 to January 2021).



Figure(1): Flow chart of the study

Methods

Before starting the first session, the treatment procedures were explained to all the women to obtain their confidence and cooperation.Participants were separated randomly into two equivalent groups.

Study group (A)

Study group A,consisting of20 women, received laser acupuncture therapy and pelvic floor training every other day for 30 min,three times per week for 12 sessions.

Laser acupuncture

The laser was applied directly to the skin over acupuncture points, and each point received a shoot of 65 seconds. The focuses most usually utilized in acupuncture are BL31, BL32, BL33, and BL34; they have named Urinary Bladder points, which are found posteriorly above the primary, second, and third sacral foramina. The patient was asked to assume a prone lying position, with the lower back exposed. Start locating the acupuncture points (BL31 - BL34) on both sides, which are located above the sacral foramina. The area of application should be sterilized with an alcohol swab. Then, start adjusting the parameters of the laser (Uni-Laser 201) with the output level 100% and 830nm in wavelength and the duration for each point 65s.

Pelvic floor training

The patient was asked to lie in a crock lying position on a treatment table. The exercise consists of 3 steps: 1ststep (pubovaginalis muscle) The patient lay with only one stretched layer of clothes on the lower abdomen to allow precise observation. The therapist stood beside the patient at the level of her pelvis. Asked the patient to try to contract as she controls her urethral orifice, concentrate on this action, hold then relax, andRepetitions for10 times.2ndstep (puborectalis muscle): The patient lay in a crock lying position, Therapist stood beside the patient with both of his/ her hands under the glutei with the tips of the fingers around the anus to feel the contraction of the muscle. Asked the patient to try to contract as she controls her bowel action, asked her to concentrate on this action, hold for a few seconds, and then relax. Avoid any contraction of the glutei; repetitions for10 times.3rdstep (pubococcygeus muscle):The patient lay with only one stretched layer of clothes on the lower abdomen to allow precise observation for lowering the lower abdomen and thighs. Thighs slightly apart to avoid substitution by the adductor, the therapist stood beside the patient at the level of her pelvis, both of his/her hands under the glutei and the tips of fingers around the anus. While the therapist's eyes are looked on the lower abdomen to observe contraction of the pubovaginalis part. Asked the patient to try contraction as if she controls bowel action, urethral orifice and draw the vagina up through contraction the lower abdomen, asked her to concentration in this action, hold for few seconds then relax,Repetitions for10 times

Control group(B)

Control group B,consisting of20 women, maintained their standard medical treatment.

Outcome measures

The assessment for the participants in both groups (A and B) was carried out before and after the treatment programthrough:

1-Modified oxford grading scale (MOS)Via vaginal palpation was used to measure pelvic floor muscle strength. The strength of PFMS is graded on a scale of 0-5.

2-Perineometer (Periton9300) Cardio Design Pty Ltd Australia developed the Periton 9300, which comes with a vaginal sensor. It was used to measure the pelvic floor muscle strength objectively.

Statistical analysis

Data were collected, coded then entered as a spreadsheet using Microsoft Excel 2016 for Windows, of the Microsoft Office bundle; 2016 of Microsoft Corporation, United States. Data wereanalyzed using IBM Statistical Package for Social Sciences software (SPSS), 26th edition, IBM, United States. (SPSS Inc., Chicago, IL, USA) & Microsoft Excel 2016. Quantitative data were expressed as mean ± SD (Standard deviation). Paired T-test was used to compare between two groups. Data were significant at P value less than 0.05 and highly significant at the P less than 0.001.

Results

Table 1 showed no significant difference between the mean age and BMI of the two groups (A and B) at the beginning of the study, as P is equal to 0.1955 and 0.333, respectively.

Table 1 Physical characteristicsof subjects

Physical characteristics	Study group (A) (Mean± SD)		Control Group (B) (Mean± SD)		t -value	P-Value	Significance
Age (Years)	56.40	± 4.16	58.10	± 4.00	1.318	P< 0.1955	NS
BMI(Kg/m^2)	33.80	± 2.90	34.67	± 2.698	0.980	P< 0.333	NS

SD: standard deviation; t-value, unpaired t-value

Pelvic floor muscle strength assessed by Modified Oxford Grading Scale(MOGS)

Table 2 showed pelvic floor muscle strength level in the Modified Oxford Grading Scale (MOGS) before and after treatment in both groups(A&B). There was a highly significant difference in the paired t-test between pelvic

floor muscle strength after treatment for the study group (A), and there was a significant difference in the control group (B). The mean value of the study group (A) was (3.90 ± 0.79) and the t-value was (14.236) and P-value was (0.000). For the control group (B), the mean was (1.85 ± 0.59), where the t-value was (2.517), and P-value was (0.021). Also,it showed there was a highly significant difference in the unpaired t-test between the two groups. The mean difference was (2.05), where the t-value was (9.329), and P-value was (0.000), favoring study group (A) as shown in Table 3.

Table 2 Pelvic floor muscle strength was assessed by (MOGS) before treatment and after the 12th session for both groups(A&B).

	Before Treatment Mean± SD	After Treatment Mean± SD	t -value	P-value	Significance
Study group (A)	1.50± 0.688	3.90± 0.79	14.236	P< 0.000	HS
Control group (B)	1.60± 0.50	1.85± 0.59	2.517	P< 0.021	S

HS, highly significant; S, significant; t-value, unpaired t-value

Table 3 Pelvic floor muscle strength assessed by (MOGS) between groups (A&B)

Statistical variables	Before treatment	After treatment
MD	-0.10	0.525
t -value	2.05	9.329
P-value	P< 0.603	P< 0.000
Significance	NS	HS

HS, highly significant; MD, mean difference; NS, nonsignificant; t-value, unpaired t-value

Intravaginal pressure assessed by perineometer

Table 4 showsthe level of intravaginal pressure assessed by perineometerbefore and after treatment in both groups. There was a highly significant difference in paired t-test between intravaginal pressure after treatment

for the study group (A), and there was a not significant difference in the control group(B). The mean value of the study group (A) was (14.50 ± 1.91) and the t-valuewas(12.137),andP-valuewas(0.000).Forthecontrolgroup(B),themeanwas(8.30 ± 1.94), where the t-value was (0.369), and P-value was (0.716). Also, there was a highly significant difference in the unpaired t-test between the two groups as the mean difference was (6.2), where the t-value was (10.269), and P-value was (0.000),favoring the study group (A) as shown in Table 5.

Table 4 Intravaginal pressure assessed by perineometerbefore treatment and after end of 12th session for both groups(A&B).

	Before Treatment Mean± SD	After Treatment Mean± SD	t -value	P-value	Significance
Study group (A)	8.00 ± 2.08	14.50 ± 1.91	12.137	P< 0.000	HS
Control group (B)	8.30 ± 2.05	8.30 ± 1.94	0.369	P< 0.716	NS

HS, highly significant; NS, nonsignificant; t-value, unpaired t-value

Table 5 Intravaginal pressure assessed by perineometer between groups (A&B)

Statistical variables	Before treatment	After treatment
MD	-0.3	6.2
t -value	0.459	10.269
P-value	P< 0.649	P< 0.000
Significance	NS	HS

HS, highly significant; MD, mean difference; NS, nonsignificant; t-value, unpaired t-value

Discussion

According to the statistical analysis of the result of the study, it was found that study group (A) showed a highly significant improvement in pelvic floor muscle strength after treatment, while the control group(B) showed a significant improvement. Also, there was a highly significant difference between groups concerning pelvic floor muscle strength favoring the study group (A). The current study's findings can be explained by the discovery of Fitz et al. [14].Who suggested that PFM strengthening could prompt a decrease in the incidence of urinary incontinence. During an expansion in intra-abdominal pressure, accurate, well-timed, quick, and solid PFM constriction reduces leakage, facilitated by urethral clamping or mechanical pressure on the pubic symphysis, which prevents urethral plummet or an increment in urethral pressure. In this analysis, we used the Oxford Grading Scale to determine the severity of the PFM, and the two gatherings showed improvement in this boundary after treatment.

These results align with Hersh and Salzman [15], who claimed that pelvic floor exercises entail regular contractions of the pelvic floor muscles to strengthen the muscles and improve micturition control. As a result, muscle contraction reduces UI by causing urethral closure and decreasing detrusor muscle central nervous system stimulation.

The results of the present study also agree with Malhotra and Chahal[16],that confirmedthere was a significant improvement in the symptoms scores of the experimental group in which pelvic floor muscles were employed in contrast with the control group. Pelvic floor muscles should be done under the supervision of a physiotherapist, as the geriatric population needs some external support to complete the pelvic floor exercise protocol.The result of the present study comes in line with the finding of Soni et al. [17],who noticed a significant expansion in mean force of the perineometer and perseverance time following one month of the investigation in which everyone the subjects went for Kegel exercise for a whole one-month term**.** Also, Castro et al. [18]observed that pelvic floor muscle training, electrical stimulation, and vaginal cones were equally effective for the management of stress urinary incontinence in comparison to no treatment. They believed that pelvic floor muscle training should be offered as the best therapy option for stress urinary incontinence.

Another explanation by Ogrinc et al. [19] showed that the Studies have indicated that negligibly intrusive, non-surgical, and non-ablative laser treatment could successfully be utilized for the treatment of UI. Two meetings of laser treatment utilizing ER: YAG laser significantly decreased Incontinence Severity Index (ISI) and improved the side effects of Urinary incontinence in all age gatherings. In opposition to our theory, age did not impact the eventual outcome. Then again, the result was fundamentally reliant on the kind of incontinence analyzed before accepting treatment.

Moreover, another studyevaluated the course of a 6-week treatment period, electroacupuncture that included the lumbosacral district decreased urine leakage substantially more than placebo electroacupuncture. The effects persisted 24 weeks after treatment. The incidence of adverse events was low.Acupuncture stimulates

S3 and the pudendal nerve in the lumbosacral region through BL33 and BL35. As a result, electroacupuncture will help relieve SUI symptoms by reinnervating and relaxing pelvic floor muscles. This potential connection may also be due to the electroacupuncture treatment's delayed effects in this research [13].

Another explanation by Yoshimura et al. [20], who showed that acupoints were also based on both TCM's meridian theory and western medicine's innervations of the urinary system. In TCM, SUI is linked to bladder dysfunction. The healing properties of an acupoint are attributed to its precise position and associated meridian, according to the meridian principle. Acupoints on the bladder meridian and situated on the lumbosacral region (adjacent to the bladder) are favored in acupuncture for SUI. Two of the acupoints that qualified were BL33 and BL35. Because of weak pelvic floor muscles, the pathophysiology of SUI is related to urethral sphincter dysfunction and urethral hypermobility.

Conclusion

It concluded that Laser acupuncture and pelvic floor training are effective and safe methods in treating stress urinary incontinence in Obese Postmenopausal Women.

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Conflicts of interest

There are no conflicts of interest

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