

## Effect of Electroacupuncture on Postpartum Stress Urinary Incontinence

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**Abstract:** *Aim:* Postpartum urinary incontinence (PPUI) can greatly lead to the decreased quality of life during the puerperal period. Electro-acupuncture was verified as an effective therapy for SUI. The primary objectives of this pre-post-controlled trial is to determine the effect of electro acupuncture on post-partum stress urinary incontinence, through measuring of intravaginal pressure (by perineometer) and Quality of life (by ICIQ-SF). *Methods:* This study was carried upon twenty-eight women with post-partum stress urinary incontinence recruited from Kufr\_shokr central hospital, Banha, Egypt, their age ranged from 25-35 years old and their BMI was less than 30 kg/m<sup>2</sup>. The participants were randomly distributed in two groups equal in number: Control group (A) consisted of 14 females who received Kegel exercise 3 times /week for 4 weeks. Study group(B) consisted of 14 female who received 30 min electrical stimulation in the form of electro acupuncture Bilateral on the points Zhong Liao (BL33) and Hui Yang (BL35) in addition to Kegel exercises as group A. All females in both group (A and B) were assessed pre and post treatment by perineometer and (ICIQ-SF) questionnaire. Mann-Whitney U test was used to compare outcomes between groups and Wilcoxon signed rank test to detect differences within groups. *Results:* There were significant improvement in intravaginal pressure and ICIQ-SF post treatment compared to pretreatment in both groups A & B ( $P \leq 0.007$  &  $p < 0.001$ ) and ( $p < 0.001$  &  $p < 0.001$ ) respectively, with significant differences in only intravaginal pressure posttreatment ( $P = 0.002$ ) between both groups in favoring to group B. *Conclusion:* Addition of electroacupuncture to Kegel exercise had significant effect on intravaginal pressure in women with SUI, compared to exercise alone.

**Key words:** Postpartum • Stress Urinary Incontinence • Kegel Exercise • Electroacupuncture

### INTRODUCTION

Urinary incontinence (UI) is a common disorder during the period of pregnancy-puerperium cycle. It has been reported that the prevalence of this condition ranges from 18.6% to 75% during the period of pregnancy and 6% to 31% during the period of postpartum [1]. Urinary incontinence occurred during the postpartum period also called postpartum urinary incontinence (PPUI). It can greatly lead to the decreased quality of life during the puerperal period [2].

Several factors account for the UI during the period of pregnancy and the puerperium, such as pregnancy itself, hormonal changes, anatomical injury after birth and dynamic forces [3]. Factors known to be associated with a greater risk of postpartum incontinence include

vaginal delivery (in the short term); previous urinary incontinence; and heredity, including anatomical and physiological factors such as pelvic anatomy and connective tissue structure [4]. These may result in suboptimal positioning of these structures at rest or on exertion and/or dysfunction of the neuromuscular components that help control urethral pressure, or both. As a result, the bladder outlet (urethra) is not closed properly during exertion causing leakage [5]. SUI is very frequent condition during the puerperal period. SUI are embarrassed to take part in social activities and as risk of lifestyle-related disease, such as osteoporosis, obesity as a result their lifestyles are altered putting them at increased incidence of diabetes, hypertension, coronary disease, mammary cancer, carcinoma of colon, depression, anxiety and so forth [6].

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Pelvic floor muscle exercises (PFME) remain a key factor in the prevention and treatment of UI. This conservative therapy appears to have no significant side effects and help in improving symptoms. It can therefore be considered as the first choice of treatment for UI in women. It has been demonstrated that PFME can improve the strength of the female PFMs contraction, increase intraurethral pressure and elevate the urethra to maintain continence. Through the agency of all these benefits, symptoms of SUI in women result in improvement [7].

Acupuncture may relieve both SUI and UUI symptoms, it might modulate and enhance the function of sacral nerves and pelvic floor muscle [8].

So, this study was conducted to contribute and add new information that may help the field of physical therapy. It would provide an evidence bases for efficacy of electro acupuncture combined by Kegel exercise on management of post-partum stress urinary incontinence, owing to its low cost, ease of use that may lead to improvement of symptoms.

## MATERIALS AND METHODS

**Study Design and Setting:** This pretest- posttest randomized control group study was conducted at the out-patient clinic of Kufr \_shokr central Hospital, Banha, Egypt.

### Patient Eligibility Criteria

**Inclusion Criteria:** Women with the following criteria was included in this study: Their ages ranged from 25 to 35 years old, their body mass index (BMI) was less than 30 kg/M<sup>2</sup>, they were suffering from post-partum stress urinary incontinence for at least 2 months to one year following delivery, They meet the diagnosis of simple FSUI (urine leakage associated with increased abdominal pressure from laughing, sneezing, coughing, climbing stairs, or other physical stressors on the abdominal cavity and all women were conscious and free from any medical disease.

**Exclusion Criteria:** Women with the following criteria were excluded from this study: Women with cardiac problems, epileptics, women with pacemakers, pregnant women, malignancy and cardiovascular disease, women with skin infection, women with previous operation for urinary incontinence or a pelvic floor, symptomatic urinary tract infection.

### Recruitment, Enrollment and Randomization

**Procedures:** Recruitment method was by written announcement and by first author who is physical therapist in the hospital, who is in face to physical therapy referrals.

The randomization sequence was generated using closed envelopes method. The randomization assignment for each participant can only be obtained by the first author and informed to participant once that participant has completed eligibility criteria, consent form and baseline assessments.

All outcomes were assessed at baseline and after treatment (4 weeks).

**Interventions:** Before starting treatment session, each patient in this group was asked to evacuate her bladder to be relaxed.

**Kegel Exercises (For Both Groups A & B):** The physical therapist asked the patient to lie in crook lying position. And asked her to keep her stomach, buttocks and thigh muscles relaxed during the entire exercise. Then she was asked to breathe slowly, notice her stomach rises when she inhales or take a breath in and her stomach falls as she exhale or breathe out. Then the patient was asked to squeeze the pelvic muscles tight and hold the contraction then relax in the following sequence

- 10 repetitions of 5 seconds contraction with 10 seconds relaxation time.
- 10 repetitions of 5 second contraction with 5 seconds relaxation time.
- 20 repetitions of 2 second contraction with 2 seconds relaxation time.
- 20 repetitions of 1 second contraction with 1 second relaxation time (Quick flick Maneuver)
- 5 repetitions of 10 second contraction with 10 second relaxation time
- 5 repetitions of strong contraction and stimulated cough with 1-minute interval (Knack Maneuver)

### Points to Be Considered:

- Feel your pelvic floor muscles 'lift up' inside, rather than a downward movement
- Relax your thighs and buttocks
- Keep breathing normally
- Stop exercising if your muscles fatigue [9].



Fig. 1: Electro-acupuncture application

**Electroacupuncture (Group B):** Each woman was asked to lie on the plinth in prone lying position, covered by a white sheet except the treated area. Then the acupuncture point for SUI were localized: Zhongliao (BL33): located bilateral on the level of the third sacral foramen) and Huiyang (BL35): located 0.5 *cun* [ $\approx 10$  mm] lateral to the extremity of the coccyx on both side).

At first, the skin of these point was cleaned with a piece of cotton immersed in alcohol. For BL33, the needle was inserted at the third sacral foramen at an angle of 30-45° and to a depth of 50-60 mm. The needle was manipulated with an even lifting, thrusting and twisting method and a sense of soreness and distention was radiated to the perineum or the anus.

For BL35, the needle was inserted upward and outward and then manipulated with an even lifting, thrusting and twisting method and a sense of soreness and distention was radiated to the perineum or the anus.

An electric stimulator was placed on the pair of points with a square-wave, 10/50 Hz, 1-5 mA. The current intensity was increased to a bearable limit. Treatment session was lasted for 30 min., 3 times /week for 4 weeks.

After that, the electrical stimulation device was switched off and acupuncture needles were removed and not used again Fig. (1).

After finishing the electroacupuncture session, each patient in this group was asked to perform Kegel exercise as group (A) for 30 min, 3 times /week for 4 weeks.

### Outcome Measures

**Primary Outcome: (Intravaginal Pressure):** Perineometer was used to measure intravaginal pressure for both groups (A, B) before and after the treatment program.

(XFT\_0010) pneumatic pelvic muscle trainer is a new innovation product owned by XFT. it easy for objective

assessment of the strength as well as training of the pelvic floor muscle. The perineometer consist of main unit, connecting tube and vaginal sensor probe[10].

**Secondary Outcome: (The ICIQ- SF):** Is a brief questionnaire comprising three scored items and one unscored self-diagnosis item to assess the prevalence, frequency and severity of urinary leakage and its impact on quality of life. The total sum of three items are calculated to provide a summary score, ranging from 0 to 21 with higher scores indicative of increased severity and greater impact on quality of life [11].

**Data and Statistical Analysis:** Mann-Whitney U test was used to compare outcomes between groups and Wilcoxon signed rank test to detect differences within groups.

## RESULTS

Scores of dependent variables were normalized (divided by) to body weight (as it was differed significantly between groups). These normalized data were presented in tables. Descriptive statistics of row data were written on text.

### The Result of this Study Was Presented as Follow

#### Demographic Data

**Group a (Control Group):** Fourteen female patients were included in this group. Their median (IQR) of age, weight, height, BMI and number of parity were 33.5(6.5) years, 68.5(11.25) kg, 166(10.75) cm, 26.6(3.6) kg/m<sup>2</sup>, 3(2) normally born childs, respectively Table (1).

**Group B (Study Group):** Fourteen female patients were included in this group. Their median (IQR) of age, weight,

height, BMI, number of parity were 33.5(5.25) years, 79(5.5)kg, 163.5(9)cm, 29.7(2.37)kg/m<sup>2</sup>, 3(1.25) normally born childs, respectively Table (1).

Comparing demographic data between both groups, with, revealed non-differences (homogenous groups) except in weight (P-value < 0.006) and BMI (P-value < 0.001) in favor of study group, Table (2). Accordingly, Outcome scores of the patients were normalized to their weight.

### Inferential Statistics for Dependent Variables

#### I-Intravaginal Pressure

##### Within Groups Differences

**Group a (Control):** The median (IQR) values of intravaginal pressure scores at pretreatment and posttreatment were 2(2) and 3 (3), respectively. There were significant differences between pre and posttreatment scores (normalized to weight) (P-value = 0.007), with significant improvement in intravaginal pressure posttreatment, Table (3).

**Group B (Study):** The median (IQR) values of intravaginal pressure scores at pretreatment and posttreatment were 2(1.25)and 5 (1.25), respectively. There were significant differences between pre and posttreatment scores (normalized to weight) (P-value= 0.001), with significant improvement in intravaginal pressure posttreatment, table (3)

**Between Groups Differences:** There was significant difference between groups posttreatment in intravaginal pressure scores (U= 33.5, P-value = 0.002) in favor of group B (Study), Table (4) No significant difference between groups at pretreatment (U= 76, P-value = 0.33), revealing homogenous groups.

Table 1: Descriptive statistics of demographic data for both groups

Demographic data	Group	Median	IQR
Age (years)	A	33.5	6.5
	B	33.5	5.25
Weight (kg)	A	68.5	11.25
	B	79	5.5
Height (cm)	A	166	10.75
	B	163.5	9
BMI (kg/m <sup>2</sup> )	A	26.6	3.6
	B	29.7	2.37
Number of parity (count)	A	3	2
	B	3	1.25

BMI: Body mass index; IQR: Inter quartile range

Table 2: Differences between groups in demographic data

Demographic data	P- value
Age	0.734
Weight	0.007*
Height	0.57
BMI	0.000*
Number of parities	1

(\*): Significant at P<0.05

Table 3: Descriptive statistics for intravaginal pressure (normalized to weight) at pre and posttreatment in both groups

	Pre Median (IQR)	Post Median (IQR)
Normalized Intravaginal pressure scores		
Group A	0.03(0.03)	0.046(0.04)
Group B	0.024(0.01)	0.062(0.02)

Table 4: Within groups differences in intravaginal pressure scores:

Pre VS. Post	Z <sup>^</sup>	P-value
Group A	-2.8	0.007*
Group B	-3.3	0.001*

\*Significant at alpha level <0.05, <sup>^</sup>(Wilcoxon signed rank test)

Table 4: Differences between groups in intravaginal pressure scores:

Group A VS. Group B	U	P-value
Pre	-76	0.33
Post	-33.5	0.002 <sup>^</sup>

<sup>^</sup>(Mann -whitney U test); \*(significant at P <0.05)

#### The ICIQ- F:

##### Within Groups Differences

**Group a (Control):** The median (IQR) values of ICIQ- SF scores at pretreatment and post treatment were 8(3.5) and 6 (4.25) points, respectively. There were significant differences between pre and posttreatment scores (normalized to weight) (P-value = 0.001), with significant decrease in ICIQ- SF scores posttreatment, Table (5).

**Group B (Study):** The median (IQR) values of ICIQ- SF scores at pretreatment and post treatment were 11.5(3.5) and 6 (4.5) points, respectively. There were significant differences between pre and posttreatment scores (normalized to weight) (P-value = 0.001), with significant decrease in ICIQ- SF scores post treatment, Table (5).

**Between Groups Differences:** There was non-significant difference between groups post treatment in ICIQ- SF scores (U= 90, P-value =0.734), Table (7) No significant difference between groups at pre treatment (U= 66, P-value = 0.15), revealing homogenous groups.

Interestingly, ICIQ- SF scores (without normalization) pretreatment were significantly differ between groups that may suggest significant effect of body weight on ICIQ- SF scores.

Table 5: Descriptive statistics for ICIQ- SF scores (normalized to weight) at pre and posttreatment in both groups

Normalized ICIQ- SF scores	Pre Median (IQR)	Post Median (IQR)
Group A	0.12(0.05)	0.09(0.06)
Group B	0.15(0.07)	0.075(0.06)

Table 6: Within groups differences in ICIQ- SF scores:

Pre VS. Post	Z <sup>^</sup>	P-value
Group A	-3.3	0.001*
Group B	-3.3	0.001*

\*Significant at alpha level <0.05, ^ (Wilcoxon signed rank test)

Table 7: Differences between groups in ICIQ- SFscores:

Group A VS. Group B	U <sup>^</sup>	P-value
Pre	-66	0.15
Post	-90	0.734

^ (Mann –Whitney U test)

## DISCUSSION

The primary objective of this pre-post-controlled trial was to determine the effect of electro acupuncture on post-partum stress urinary incontinence, through measuring of intravaginal pressure (by perineometer) and QOL by (ICIQ-SF).

It was hypothesized that, there would be no effect of electro acupuncture when applied with Kegel exercises in women suffering from post-partum stress urinary incontinence. Results of this study failed to accept this general hypothesis, as there was significant improvement in intravaginal pressure and ICIQ-SF posttreatment in both groups(A&B) ( $P \leq 0.007$ ,  $p < 0.001$ ) and ( $p < 0.001$ ) respectively, with significant differences in only intravaginal pressure posttreatment ( $P = 0.002$ ) between groups.

In the current study the control group receiving Kegel exercise showed intragroup significant improvement in both intravaginal pressure and ICIQ-SF. this improvement could be explained as PFMT is effective in enhancing the urethral sphincter cross section area that result in hypertrophy of urethral sphincter, also PFMT could increase awareness and skill development of timing the contraction with the event that cause leakage

The result of this study agrees with the result of Soni *et al.* [12] who concluded that Kegel’s exercises is associated with increase in strength and endurance in pelvic floor muscles. Increase in endurance translates in to better holding capacity and less or no episode of leakage.

This run in the same line with Liu *et al.* [13] who determined that the PFMT is effective for the treatment of MUI. Also, Price *et al.* [14] reported that Pelvic floor

muscle exercise is particularly beneficial in the treatment of urinary incontinence in females. Studies have shown up to 70% improvement in symptoms of stress incontinence following appropriately performed pelvic floor exercises.

Concerning the significant increase in intravaginal pressure and clinical improvement in ICIQ-SF in study group who received EA and Kegel exercise could be explained by electrical stimulation of acupoint BL33, BL35 stimulate S2–3 nerve roots, which innervate the urinary bladder, urethra and pelvic floor area. These sacral nerve roots are the parasympathetic center of the spinal cord; thus, EA stimulation at S2–S3 may induce stabilization of the pelvic floor through afferent/efferent neuromodulation and help to recover bladder and bowel function

The result of this study comes in agreement with Sun *et al.* [15] who reported that EA may have good effects in both elderly and non-elderly women with SUI or stress-predominant MUI and explained the mechanism of action of EA may involve stimulation of S3 via BL33 and that of pudendal nerve via BL35, which promotes pelvic floor muscle contraction and augments muscle strength.

The result of this study is consistent with the Results of Sun *et al.* [16] who found the effects of EA and PFMT–solifenacin were similar in relieving incontinence-related symptoms and improving life quality of women with urgency-predominant MUI and found that EA at sacral region might modulate the function of autonomic nerves and inhibit detrusor overactivity to cope the UUI component. It might also promote the contraction of pelvic floor muscle and increase the maximum urethral closure pressure to treat SUI component

The result of this study come in consistent with Wang *et al.* [17] who compared the efficacy between electroacupuncture and sham acupuncture in postmenopausal women and concluded that electroacupuncture group had a greater reduction in symptoms of SUI at 24 weeks than sham acupuncture group. And may have sustained post-treatment reductions in urinary incontinence episodes among postmenopausal women with SUI.

The result of this study come in consistent with the result of Sun *et al.* [18] who reported that acupuncture has a positive effect on nerve regeneration. For patients following a hysterectomy, acupuncture can help to restore and rebuild damaged nerves, which can not only improve bladder dysfunction, but also prevent bladder dysfunction. Second, the dysfunction of bladder sphincter and urethral internal sphincter is one of the important pathophysiological mechanisms of urinary

incontinence. Acupuncture of BL32, BL33 and BL34 can increase the maximum pressure of urethral closure by stimulating sacral nerve. The sensation produced by acupuncture can cause pelvic floor muscle contraction and simulate pelvic floor muscle training. Third, acupuncture regulates neurotransmitter production, such as catecholamine. Through the mediation of sympathetic alpha-adrenergic receptor and beta-3-adrenergic receptor, the smooth muscle of urethra is stimulated and the detrusor of bladder is inhibited.

Ozdemir and Surmeli [19] reported that the aim of ES in the treatment of patients with SUI is to improve the function of the PFMs by stimulating its contraction to ensure that the pelvic floor will provide adequate support with the advancement in PFM strength to prevent urine loss during an increase in intra-abdominal pressure

The result of this study come in agreement with Su *et al.* [20] who found that electroacupuncture is effective, safe, non-invasive and low-cost treatment options for this specific patient group and is a better treatment for SUI compared with PFM training.

The result of this study come in agreement with the result of Lian *et al.* [21] who concluded that the transcutaneous acupoint electrical stimulation achieves the better efficacy on FSUI [female stress urinary incontinence] as compared with the oral administration of midodrine hydrochloride tablets. This therapy effectively improves the patient's urine control ability and reduces leakage of urine.

Also, Paik *et al.* [22] concluded that acupuncture may be beneficial to patients with urinary incontinence.

The result of this study come in agreement with the result of Zhao and Wang [23] they concluded that electrical perineal nerve stimulation [EPNS] therapy through deep acupuncture using long needles that cause activating the pudendal nerve can induce rhythmic contraction of the pelvic floor muscles and thus, strengthen these muscles to hold urine and control urination. Unlike active pelvic floor exercises, EPNS is a passive exercise method, which can directly induce passive contraction of the pelvic floor muscles [without patients' voluntary muscle contraction exercise] and therefore, enhance patients' compliance. This clinical trial has indicated that EPNS is positively effective for female SUI. In terms of treatment frequencies, patients who were treated 3 times a week obtained better effects than those who were treated twice a week. Within a certain time, frame, an increased frequency means more pelvic floor exercises, which can in turn strengthen the contraction of the pelvic floor muscles and improve the clinical effect.

Also, the result of this study goes in harmony with butler [24] who suggest that Needling Zhongliao BL-33 and using electro-stimulation of Fuliu KID-7 and Rangu KID-2 should be considered as potentially valuable point prescriptions to be used in the treatment of urinary incontinence, frequent urination and over-active bladder.

The result of this study disagreed with Castro *et al.* [25] who found that the pelvic floor muscle training, electrical stimulation and vaginal cones are equally effective and better than no treatment in the management of women with urodynamic stress urinary incontinence, as the present study found the EA had significant effect over exercise alone.

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