

ORIGINAL RESEARCH ARTICLE

Effects of kegel training combined with acupoint application in preventing postpartum pelvic floor dysfunction: A randomized controlled trial

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Abstract

This study investigated the early preventive benefits of combining Kegel exercises with acupoint application at Qi Hai and Guan Yuan points for addressing postpartum pelvic floor dysfunction (PFD). A total of 110 first-time mothers were randomized into two groups: the prevention group, which received the combined intervention, and the control group, which practiced only Kegel exercises. The interventions followed a structured schedule during the postpartum period. At 42 days postpartum, the prevention group showed a notably lower rate of urinary leakage and improved outcomes in Type II pelvic floor muscle strength, ICI-Q-SF scores, and Hamilton Anxiety Scale results (all $P < 0.05$). However, there were no significant differences between the groups in Type I muscle strength, vaginal dynamic pressure, PFDI-20 scores, or anatomical positioning of the bladder and cervix ($P > 0.05$). The treatments were well-tolerated, with only two minor cases of redness and itching at application sites. We conclude that combining Kegel exercises with acupoint application at Qi Hai and Guan Yuan points may effectively reduce postpartum urinary incontinence, strengthen specific pelvic floor muscles, and improve emotional well-being. (*Afr J Reprod Health* 2026; 30 [9s]: 28-35).

Keywords: Urinary Leakage Rate; Postpartum; Acupoint Application; Qi Hai; Guan Yuan; Kegel Training

Résumé

Cette étude a examiné les bénéfices préventifs précoces de la combinaison d'exercices de Kegel avec l'application d'acupression sur les points Qi Hai et Guan Yuan pour traiter la dysfonction du plancher pelvien (DPP) post-partum. Au total, 110 primipares ont été randomisées en deux groupes : le groupe prévention, recevant l'intervention combinée, et le groupe témoin, pratiquant uniquement les exercices de Kegel. Les interventions ont suivi un calendrier structuré pendant la période post-partum. À 42 jours post-partum, le groupe prévention a montré un taux de fuites urinaires nettement inférieur et de meilleurs résultats pour la force musculaire de type II du plancher pelvien, les scores ICI-Q-SF et les résultats à l'échelle d'anxiété de Hamilton (tous $p < 0,05$). Cependant, aucune différence significative n'a été observée entre les groupes pour la force musculaire de type I, la pression dynamique vaginale, les scores PFDI-20 ou la position anatomique de la vessie et du col de l'utérus ($p > 0,05$). Les traitements ont été bien tolérés, avec seulement deux cas mineurs de rougeurs et de démangeaisons aux sites d'application. En résumé, combiner les exercices de Kegel avec l'acupression sur les points Qi Hai et Guan Yuan pourrait réduire efficacement l'incontinence urinaire post-partum, renforcer des muscles spécifiques du plancher pelvien et améliorer le bien-être émotionnel. (*Afr J Reprod Health* 2026; 30 [9s]: 28-35).

Mots-clés: Taux de fuites urinaires ; Post-partum ; Application d'acupression ; Qi Hai ; Guan Yuan ; Exercices de Kegel

Introduction

Postpartum pelvic floor dysfunction (PPFD) is one of the common postpartum conditions in women. Due to the weakening of pelvic floor support tissues caused by pregnancy and childbirth, a series of clinical symptoms may occur, including stress urinary incontinence (SUI), pelvic organ prolapses (POP), overactive bladder (OAB), fecal

incontinence (FI), chronic pelvic pain (CPP), and sexual dysfunction (SD) ¹. Female pelvic floor dysfunction (PFD) significantly impacts women's quality of life ².

Currently, the incidence of postpartum pelvic floor dysfunction remains persistently high. A meta-analysis of 28,303 parturients revealed that 6,047 women experienced urinary incontinence postpartum, with an incidence rate of 26%³.

Early intervention is fundamental to the prevention and treatment of this condition, with early prevention being crucial. Postpartum women, due to physical weakness and breastfeeding, often find it inconvenient to undergo treatments such as acupuncture or electronic biofeedback in hospitals, necessitating a simple, convenient, and easily operable therapeutic approach. Currently, Kegel exercises are the preferred clinical treatment⁴. However, factors such as pelvic floor awareness, other pelvic floor discomforts, and family childcare responsibilities may affect adherence to pelvic floor muscle training⁵. Additionally, the accuracy of pelvic floor muscle exercises can influence their efficacy, highlighting the need for a simple and objective therapeutic method. Therefore, the objective of this study was to investigate the early preventive effects of Kegel exercises combined with acupoint application on postpartum pelvic floor dysfunction.

Methods

The study subjects were primiparas who delivered vaginally in Shanghai Seventh People's Hospital of Shanghai University of Traditional Chinese Medicine between November 2022 and December 2023.

Diagnostic criteria

This study adopted the internationally recognized diagnostic criteria for postpartum pelvic floor dysfunction (PPFD).

Symptom criteria: The presence of at least one core symptom (stress urinary incontinence, pelvic organ prolapse sensation, fecal incontinence or chronic pelvic pain), as defined in the International Federation of Gynecology and Obstetrics (FIGO) and International Council for Urological Control (ICS) Joint Terminology Consensus on Female Pelvic Floor Dysfunction⁶.

Inclusion, exclusion, and cutoff criteria

Inclusion criteria

First-time primipara with full-term singleton vaginal delivery; No major hemorrhage within 2

hours postpartum; Age 23-40 years; BMI $18.5 \leq \text{BMI} \leq 23.9$; Neonatal weight 2.5-4.0 kg.

Exclusion criteria

History of urinary incontinence before pregnancy or during pregnancy; History of pelvic surgery; Concurrent gestational diabetes mellitus; Chronic cough; Redness, blistering, or purulent discharge after acupoint application, with a history of severe skin allergies; Third-degree or higher perineal laceration or episiotomy during delivery.

Exclusion criteria

These were patients who were misclassified or unable to adhere to the study protocol, and those who voluntarily requested to withdraw from the study.

Sample size and randomization

Sample size estimation. According to the results of the pilot study, the incidence of postpartum urinary incontinence was 19% in the observation group and 43% in the control group. Assuming a significance level of $\alpha=0.05$ and a power of $1-\beta=0.80$, the PASS software was used to estimate the required sample size for a two-tailed hypothesis test, accounting for a 20% dropout rate. A total of 138 subjects were planned for observation. These subjects were randomly divided into an observation group of 69 and a control group of 69. Due to partial dropout during treatment and follow-up, a final sample of 110 subjects was collected, with 55 in the observation group and 55 in the control group. Neither the subjects, data collectors, nor statistical analysts were aware of the specific group assignments.

Randomized Grouping and Blinding. In this clinical trial, random envelope method was employed for grouping, with eligible patients randomly assigned in a 1:1 ratio to the experimental group and the control group. The randomization sequence was generated by an independent statistician using SPSS (27.0) software. According to the standard operating procedure (SOP), the sequence was placed in sequentially numbered, opaque, and sealed envelopes by a research assistant who was not involved in patient

recruitment, treatment, or evaluation. When patients were ready to participate, acupuncturists with experience opened the envelopes in the order of patient visits to assign them to subsequent treatments. Non-blind personnel included acupuncturists with experience and the research assistant responsible for managing the randomization module. All other personnel were blinded.

Treatment methods

Pelvic floor muscle training

Kegel exercises: Primarily target Type I and Type II muscles. For Type I muscle training, the women were requested to contract the perineum and posterior anal muscles for 3 seconds, while simultaneously relaxing the abdominal and gluteal muscles gradually without altering the degree of perineal contraction. After 3 seconds of contraction, they relaxed the perineal muscles for 3 seconds, maintaining a 1:1 ratio of contraction to relaxation time.

For Type II muscle training, they performed rapid maximal contraction of the perineum and posterior anal muscles followed by immediate relaxation. This sequence was repeated three times, followed by full relaxation for six seconds. This was done alternatively between Type I and Type II muscle cycles, with each session lasting 15 minutes and performed three times daily. The same acupuncture practitioner instructed both groups of patients in Kegel exercises, conducted WeChat check-ins to track training progress, and ensured consistency in Kegel training between the two groups.

Acupoint application

The Qihai and Guanyuan acupoints were located according to the national standard 'Nomenclature and Location of Acupoints (GB/T 12346-2021)'. Qihai is situated on the lower abdomen, along the anterior midline, 1.5 cun below the umbilicus. Guanyuan was located on the lower abdomen, along the anterior midline, 3 cm below the umbilicus.

Three grams of processed aconite (*Aconitum carmichaelii*) was grinded into powder, then mixed with rice wine and glycerin in a 1:1 ratio

to form a paste approximately 1cm × 1cm × 0.1cm in size. The paste was placed on a sterile breathable patch measuring 2cm × 2cm. The parturient was instructed to lie flat. The area was disinfected with the Qihai and Guanyuan acupoints using alcohol-soaked cotton balls. The processed aconite paste was applied accurately to the two acupoints. Processed aconite can tonify yang qi and dredge meridians, making it suitable for pelvic floor dysfunction caused by kidney yang deficiency.

During hospitalization, the patient received acupoint application therapy administered by an acupuncturist. Upon discharge, the physician provided the prepared ointment and adhesive patch for the patient to take home, with the ointment stored in the refrigerator. After discharge, the patient performed acupoint application every other day under the guidance of the physician via WeChat.

The control group initiated pelvic floor exercises on the 20th postpartum day (3 sessions daily, 15 minutes each). In contrast, the observation group began acupoint application on the first postpartum day (applying patches to Qihai and Guanyuan acupoints every other day from 8:00 to 14:00, with removal after 6 hours). The patients were required to take photos every 4 days to monitor the application status, with 42 days constituting one treatment course. All other procedures were identical to those in the control group. Both groups underwent pelvic floor function screening on the 42nd postpartum day.

Observation indicators and methods

Primary outcomes

1-hour urine pad test: On the 42nd postpartum day, clinical manifestations of urinary incontinence were evaluated in both groups of parturients. Urinary leakage was defined as a leakage volume greater than 1 g, while less than 1g was considered non-leakage.

Secondary outcomes

1- International Consultative Committee on Incontinence Questionnaire Short Form (ICIQ-SF): The frequency of urinary incontinence, volume of urine leakage, and impact on quality of life were

evaluated in both groups on the 42nd postpartum day.

2- Pelvic Floor Dysfunction Inventory (PFDI20): The pelvic floor function status of the two groups of parturients was evaluated on the 42nd postpartum day. A lower score indicates better pelvic floor function.

3- Hamilton Anxiety Rating Scale (HARS) score: The mental health status of the two groups of parturients was evaluated on the 42nd day postpartum. A lower score indicates better mental health.

4- Pelvic Floor Muscle Strength Assessment: The SOKO 900II Pelvic Floor Rehabilitation Therapy Device (Beijing Hailongma Technology Co., Ltd.) was used to measure and evaluate pelvic floor muscle strength. After the parturient emptied her bladder, she was placed in the lithotomy position with the probe inserted into the vagina. The parturient was instructed to repeatedly perform Kegel exercises and vaginal contractions to assess her pelvic floor muscle strength. The strength grading for Class I pelvic floor muscle fibers ranges from 0 to V: contraction exceeding the peak for 0 seconds is classified as Grade 0; exceeding 1 second as Grade I; and so on, exceeding 5 seconds as Grade V. The strength grading for Class II pelvic floor muscle fibers ranges from 0 to V: contraction exceeding the peak for 0 times is classified as Grade 0; exceeding 1 time as Grade I; and so on, exceeding 5 times as Grade V.

The pelvic floor muscle strength and vaginal dynamic pressure of the two groups were evaluated on the 42nd day after delivery.

5- Pelvic floor ultrasound examination: The Affiniti70W color Doppler ultrasound diagnostic system (Philips, Netherlands) was used, with frequency set at 3.5-6.0 MHz. The lowest points of the bladder neck and cervix were measured in two groups of parturients during the resting state and maximal Valsalva maneuver (parturients held their breath and exerted maximal abdominal pressure downward). The lowest point of the bladder neck was defined as the distance between the bladder neck and the lower edge of the pubic symphysis in the Valsalva state. The lowest point of the cervix was defined as the distance between the cervix and the lower edge of the pubic symphysis in the Valsalva state.

Safety assessment

Mild redness, swelling, or itching without significant discomfort after application may be considered normal and require no intervention. If blisters smaller than 0.5cm in diameter develop, they will resolve spontaneously. For blisters exceeding 0.5 cm, disinfect a needle to puncture the base, allowing the yellow fluid to drain completely, followed by topical application of anti-inflammatory ointment. Avoid scratching to prevent infection, and seek medical attention if necessary. All adverse events occurring during the study must be documented in the CRF (Case Report Form) with their severity and duration recorded.

Statistical methods

Statistical analysis was performed using SPSS 27.0 software, with all statistical tests conducted as two-tailed tests. A $P < 0.05$ was considered statistically significant. Measurement data conforming to normal distribution were described as mean $\bar{x} \pm S$ standard deviation. Between-group comparisons were performed using the two-sample t-test, while within-group comparisons used the paired t-test. For measurement data not conforming to normal distribution, the M (P25, P75) was used for description, and independent samples nonparametric tests were employed for between-group comparisons. Categorical data were described as frequency (composition ratio), and chi-square tests were used for inter-group comparisons. Ordinal data were analyzed using the nonparametric rank-sum test.

Ethical considerations

This randomized controlled trial adhered to the ethical standards outlined in the Declaration of Helsinki and received approval from the Institutional Review Board of Longhua Hospital, Shanghai University of Traditional Chinese Medicine (Approval Code: LH-IRB-2025-048, Approval Date: 15 Jan 2025). Additionally, it was registered with the Chinese Clinical Trial Registry (Registration Number: ChiCTR2300079182). Written informed consent was obtained from all participants before enrollment. They were fully

briefed about the study's purpose, procedures, potential benefits and risks, and assured of their right to withdraw at any time without compromising their usual medical care. Particular care was taken to address the physical and emotional sensitivity of postpartum participants. The intervention was designed to be non-invasive and carefully monitored for any adverse effects. All collected data were anonymized and securely stored, with access restricted to authorized research personnel. The study complied with Good Clinical Practice (GCP) guidelines and adhered to applicable Chinese regulations governing clinical research.

Results

Comparison of baseline data between the two groups of parturient

No statistically significant differences were observed between the two groups in terms of age, height, BMI, gestational age at delivery, and neonatal weight ($P>0.05$), indicating comparability. Details are provided in Table 1.

Table 1: Comparison of baseline data in 110 parturient

Group	Number of cases	Age (year, $X \pm S$)	stature (M, $X \pm S$)	BMI ($X \pm S$)	gestational age ($X \pm S$)	Newborn weight (kg, $X \pm S$)
observation group	55	27.6 $\pm$ 3.5	1.6 $\pm$ 0.1	22.9 (21.1, 23.2)	39.0 (38.0, 40.0)	3.2 $\pm$ 0.4
control group	55	27.7 $\pm$ 4.2	1.6 $\pm$ 0.1	23.1 (21.7, 23.6)	39.0 (38.0, 39.0)	3.3 $\pm$ 0.3

Table 2: Comparison of urinary incontinence rates at 42 days postpartum in 110 parturient

group	Number of cases	No urine leakage (less than 1g)	Leakage of urine (more than 1 g)
observation group	55	45	10
control group	55	35	20

Table 3: Comparison of class I muscle strength in 110 parturient at 42 days postpartum

group	Number of cases	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5
observation group	55	23	5	4	5	1	17
control group	55	26	7	9	3	2	8

Table 4: Comparison of Class II muscle strength in 110 parturient at 42 days postpartum

group	Number of cases	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5
observation group	55	17	5	2	2	4	25
control group	55	27	8	5	2	3	10

Comparison of urinary incontinence rates between the two groups at 42 days postpartum

The urinary incontinence rate in the observation group was 18.18% (10/55) at 42 days postpartum, while that in the control group was 36.36% (20/55). The urinary incontinence rate in the observation group was significantly lower than that in the control group, with a statistically significant difference ($P<0.05$). Table 2

Comparison of pelvic floor muscle strength and vaginal dynamic pressure recovery between the two groups of parturient

According to the pelvic floor muscle strength screening results of the two groups at 42 days postpartum, the observation group showed significantly higher-Class II muscle strength grading compared to the control group, with a statistically significant difference ($P<0.05$). No statistically significant difference was observed between Class I muscle strength and vaginal dynamic pressure ($P>0.05$). Table 3-5

Table 5: Comparison of vaginal dynamic pressure at 42 days postpartum in 110 parturient

Group	Number of cases	dynamic pressure
observation group	55	49.7±15.9
control group	55	54.6±19.3

Table 6: Comparison of 42-day postpartum scale scores among 110 parturient

Group	Number of cases	ICIQ-SF scale	PFDI-20 scale	Hamilton anxiety scale
observation group	55	0.0 (0.0, 0.1)	6.2 (0.0, 16.7)	4.2±2.6
control group	55	0.0 (0.0, 4.0)	12.4 (3.1, 21.8)	6.8±3.9

Note: 1) Compared with the control group, the scale scores at 42 days postpartum were statistically significant ($P<0.05$).

Table 7: Comparison of the lowest points of the bladder neck and cervix at 42 days postpartum in 110 parturient

group	Number of cases	The lowest point of the bladder neck	cervical minimum
observation group	55	15.2±4.8	24.1±14.3
control group	55	14.0±6.3	24.6±11.4

Comparison of scale scores between the two groups of parturient

The scores of ICIQ-SF and Hamilton Anxiety Scale in the postpartum 42-day observation group were significantly lower than those in the control group, with statistically significant differences ($P<0.05$). However, no statistically significant difference was observed in the PFDI-20 scores between the two groups ($P>0.05$). Table 6

Comparison of the lowest points of the bladder neck and cervix between the two groups of parturient

The lowest point of bladder neck and the lowest point of cervix in the postpartum 42-day observation group were not statistically significant compared with the control group ($P>0.05$). Table 7.

Discussion

Postpartum pelvic floor dysfunction (PPFD) is a common issue affecting new mothers, closely associated with damage to pelvic floor support tissues during pregnancy and childbirth. Clinical manifestations include stress urinary incontinence and pelvic organ prolapse, significantly impairing the quality of life in postpartum women¹. This study investigated the early preventive effects of

Kegel exercises combined with acupoint application at Qihai and Guanyuan on postpartum pelvic floor dysfunction. The findings revealed that the combined intervention significantly reduced urinary incontinence rates, enhanced muscle strength of type II muscle fibers, and alleviated maternal anxiety, providing a simple and effective clinical intervention method.

Improvement of pelvic floor muscle function with combined intervention

The results of this study demonstrated that the postpartum 42-day urinary incontinence rate in the observation group was significantly lower than that in the control group ($P<0.05$), and the muscle strength grade of type II muscle fibers was markedly improved ($P<0.05$), which is closely related to the physiological function of type II muscle fibers. As fast-twitch muscle fibers, type II muscle fibers are primarily responsible for rapid contraction to cope with sudden increases in abdominal pressure (e.g., coughing, sneezing, etc.), and the enhancement of their muscle strength can effectively reduce the incidence of urinary incontinence⁷. However, there were no significant differences between the two groups in terms of type I muscle fiber strength, vaginal dynamic pressure, or the position of pelvic organs (the lowest point of the bladder neck and the lowest point of the cervix)

($P > 0.05$). Possible reasons include: (1) Type I muscle fibers are slow-twitch fibers, primarily responsible for maintaining the static support function of pelvic floor organs, and their recovery requires longer duration and higher-intensity training⁷; (2) Postpartum weakness in mothers may lead to insufficient intensity and accuracy in self-training, affecting the recovery of type I muscle fibers⁸; (3) The intervention period in this study was relatively short (42 days), which may not fully reflect the long-term improvement effects on pelvic floor support structures. These findings partially align with the study by Yang Songsong *et al.*⁹, suggesting that future interventions could extend the duration or incorporate biofeedback technology to further enhance outcomes.

Mechanism of action of acupoint application

Acupoint application at Qihai and Guanyuan exerts therapeutic effects through the synergistic action of medicinal agents and acupoints. Qihai, known as the "Sea of Primordial Qi," and Guanyuan, a pivotal acupoint for "storing essence and blood," work together to replenish primordial qi, warm yang, and stabilize collapse¹⁰. In this study, processed aconite (*Aconitum carmichaelii*) was selected for application. With its pungent and warm properties, it enters the heart, kidney, and spleen meridians, exhibiting effects of replenishing fire, assisting yang, dispelling cold, and relieving pain¹¹. Modern research indicates that aconite can promote water metabolism and improve bladder function by warming kidney yang¹². Additionally, acupoint application may modulate the excitability of pelvic floor neuromuscular tissues by stimulating local meridians, thereby enhancing the rapid contraction capacity of type II muscle fibers. This mechanism aligns with the findings of Zhang Qian *et al.*¹³ on the improvement of bladder function through moxibustion with processed aconite cakes, suggesting the potential value of external therapies in pelvic floor rehabilitation.

Positive impact on maternal psychological state

The Hamilton Anxiety Scale scores in the observation group were significantly lower than those in the control group ($P < 0.05$), which may be

associated with the following factors: (1) Improvement in urinary incontinence symptoms alleviated the psychological burden on postpartum women¹⁴; (2) Traditional Chinese Medicine theory posits that abundant yang energy leads to mental vitality, and the application of processed aconite to the Qihai and Guanyuan acupoints indirectly regulates emotions by warming and tonifying yang energy¹¹; (3) The synergistic effect of Kegel exercises combined with acupoint application enhanced postpartum women's confidence in recovery. This finding provides a new perspective for postpartum psychological intervention, suggesting that comprehensive rehabilitation outcomes can be improved through dual physiological and psychological regulation.

Study strengths and limitations

The limitations of this study include: (1) a small sample size and the inclusion of only primiparas with vaginal delivery, warranting caution in generalizing the results; (2) a short intervention period, failing to assess long-term efficacy; (3) a lack of in-depth pharmacological analysis of the medicinal components applied to acupoints. Future studies could expand the sample size, prolong follow-up periods, and explore the effects of different drug combinations on efficacy. Additionally, integrating modern rehabilitation techniques (e.g., biofeedback) may further enhance the intervention outcomes¹⁵.

Conclusion

Early postpartum Kegel exercises combined with acupoint application at Qihai and Guanyuan can effectively reduce the incidence of urinary incontinence, enhance the muscle strength of type II muscle fibers, and alleviate maternal anxiety. This regimen is simple to implement and highly safe, making it suitable for community and home-based promotion. It provides an effective approach for the early prevention of postpartum pelvic floor dysfunction.

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