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Neuromuscular electrical stimulation for treating postpartum low back pain

Yue-peng Li, MM[a], Xue Cui, MM[b], Shi-chen Liu, MM[c], Shi-hua Zhang, MM[d], Yu-hang Zhao, MM[b,*]

Abstract

In this retrospective study, we investigated the effect of neuromuscular electrical stimulation (NMES) in patients with postpartum low back pain (PPLBP).

We included 67 patients with PPLBP in this study. All patients received NMES, each session 30 minutes, 1 session weekly for a total of 4 weeks. The primary outcome was measured by the reduction in pain intensity, based on the visual analogue scale (VAS). The secondary outcomes included functional status, measured by the Roland–Morris disability questionnaire (RMDQ), and quality of life, measured by the World Health Organization Quality of Life questionnaire (WHOQOL-BREF), as well as the adverse events related to the treatment. The outcome data were evaluated at baseline and at the end of 4-week treatment.

After 4-week treatment, NMES did not exert better outcomes in pain relief, measured by VAS, and functional status, measured by RMDQ compared with those before the treatment. In addition, no significant improvement in quality of life, measured by WHOQOL-BREF, compared to it before the treatment.

The results of our study did not find that NMES is effective in patients with PPLBP after 4-week treatment.

Abbreviations: LBP = low back pain, NMES = neuromuscular electrical stimulation, PPLBP = postpartum low back pain, RMDQ = Roland–Morris disability questionnaire, TMT+NMES = trunk muscle training program augmented with neuromuscular electrical stimulation, VAS = visual analogue scale, WHOQOL-BREF = World Health Organization Quality of Life questionnaire.

Keywords: effect, low back pain, neuromuscular electrical stimulation, postpartum

1. Introduction

Low back pain (LBP) is a very common health condition in primary care.[1] It is reported that more than 80% population suffer from LBP at least once in their life, and such condition still recurs in more than 60% patients.[1,2] Of this, LBP often happens during period of pregnancy and postpartum, which contribute most of the LBP types.[3]

Previous studies have reported that about more than 50% pregnant women suffer from LBP during their pregnancy and such incidence has been reported as 78%.[4,5] Such painful condition can result in a long-term pain and disability after the delivery.[5] Although the other studies found that the prevalence of postpartum LBP (PPLBP) has been reported to be 35% in the first month after the delivery, it is still the most prevalent painful condition, and is considered as a serious problem by one-third of pregnant women.[6–8]

It has been reported that nonsteroidal anti-inflammatory drugs are used as the primary treatment for the LBP.[9–11] However, serious adverse events, such as increased cardiovascular risks, are often accompanied in patients with long-term medications.[9–11] In addition, such medications are not good for the infants during their breast feeding period in patients with PPLBP. Thus, alternative therapies are still needed to treat such painful condition.

In the search for an alternative therapy, nonpharmacological interventions, including education, physical therapy, exercises, neuromuscular electrical stimulation (NMES), and acupuncture, are the potential intriguing candidates.[12–23] It has been reported that clinical data have supported the painful relief effect of the nonpharmacological interventions.[11–23] However, limited data of using NMES for treating patients with PPLBP are still available.[24] Thus, clinical studies are critically needed to investigate the safety and efficacy of NMES for treating patients with PPLBP. In this study, we assessed the potential effects and safety of NMES for the treatment in patients with PPLBP.

2. Methods/design

This retrospective study was approved by the Medical Ethical Committee of Daqing Oilfield General Hospital and First Affiliated Hospital of Jiamusi University. All the cases were collected between December 2016 and August 2017 at the above 2 hospitals. All patients provided written informed consent.

2.1. Inclusion and exclusion criteria

This study included patients with persistent PPLBP, aged 18 to 32 years. All patients were recruited about 2 months after delivery with pain intensity, measured by visual analogue scale (VAS) >4.

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Y-pL and XC contributed equally to this study.

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[a] Department of Orthopedic Surgery, [b] Department of Obstetrics and Gynecology, Daqing Oilfield General Hospital, Daqing, [c] First Ward of Orthopedic Surgery Department, [d] Department of Neurosurgery, First Affiliated Hospital of Jiamusi University, Jiamusi, China.

[*] Correspondence: Yu-hang Zhao, Department of Obstetrics and Gynecology, Daqing Oilfield General Hospital, No.9 Zhongkang Street, Saertu District, Daqing 163001, China (e-mail: zhaoyh20102@163.com).

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They were excluded if they had systemic locomotor diseases, spinal conditions, surgery history of the spine, pelvis, or femur, and cancers.

2.2. Participants and recruitment

All patients were recruited from Daqing Oilfield General Hospital and First Affiliated Hospital of Jiamusi University. After clinical assessment, 67 patients who qualified for inclusion and exclusion criteria were included in this retrospective study.

2.3. Intervention

All patients received NMES at bilateral acupoint Shenshu (BL23, 1.5 cun lateral to the posterior midline, on the level of the lower border of the spinous process of the 2nd lumbar vertebra) by using the NMES device (HANS-100; Nanjing Jisheng Medical Technology Co., Ltd, Nanjing, Jiangsu Province) with a frequency of 2 to 100 Hz. Each patient had a 30-minute treatment daily, once weekly for a total of 4 weeks.

2.4. Outcome measurements

The primary outcome was measured by the reduction in pain intensity, based on the VAS. The secondary outcomes included functional status, measured by the Roland–Morris disability questionnaire (RMDQ), and quality of life, measured by the World Health Organization Quality of Life questionnaire (WHOQOL-BREF),[24] as well as the adverse events related to the treatment. The outcome data were assessed before and after 4-week treatment.

2.5. Statistical analysis

All the outcome data were analyzed by the SAS software (version 8.2; SAS Institute, Inc., Cary, NC). The comparisons of all data before and after treatment were analyzed using the *t* test or Mann–Whitney *U* test. The statistical significance level was set at $P < .05$.

3. Results

The demographics and characteristics of all 67 included patients before treatment are summarized in Table 1. The mean ages were 30.8 (4.9) years. The educational background included 3, 5, 22, and 37 patients of primary school or below, secondary school, high school, college/university, respectively. The mean body mass index was 24.1 (2.5) kg/m^2. Twenty-one patients had sedentary occupations. Three patients were daily smokers.

Table 1

Patients characteristics before treatment (n = 67).

Characteristics	Values
Mean age, y	30.8 (4.9)
Education background	
Primary school or below	3 (4.5)
Secondary school	5 (7.5)
High school	22 (32.8)
College/university	37 (55.2)
BMI, kg/m^2	24.1 (2.5)
Sedentary occupations	21 (31.3)
Daily smoker	3 (4.4)

Data are present as mean ± standard deviation or number (%).
BMI = body mass index.

Table 2

Comparisons of pain intensity and functional status before and after treatment (n = 67).

Outcomes	Before treatment	After treatment	*P*
Pain intensity			
VAS	5.3 (1.2)	4.9 (1.5)	.09
Functional status			
RMDQ	10.5 (3.7)	9.6 (4.2)	.18

Data are present as mean ± standard deviation.
RMDQ = Roland–Morris disability questionnaire; VAS = visual analogue scale.

No significant differences in pain intensity, measured by VAS scale ($P = .09$) and functional status, measured by RMDQ ($P = .18$), were found for those patients after the treatment, when compared with these outcomes before the treatment (Table 2).

Results of quality of life, measured by the WHOQOL-BREF, are summarized in Table 3. After 4-week treatment, NMES did not exert better improvements in quality of life, measured by WHOQOL-BREF (Physical, $P = .48$; Psychological, $P = .70$; Social relationships, $P = .52$; Environment, $P = .83$; Overall quality of life, $P = .75$), when compared with those before the treatment.

4. Discussion

LBP often results from the injury to a muscle and ligament.[25] A variety of factors may cause this condition, such as arthritis, poor posture, fracture, ruptured disk or improper lifting, and pregnancy.[26–29] It has been reported that most pregnant women experienced LBP throughout the period of their pregnancy, delivery, and even after birth.[30] Of these, PPLBP was one type of LBP that occurred in pregnancy women after their delivery.[20] Several treatment options are utilized to treat this special condition. However, there is still insufficient evidence to support these therapies. Thus, new potential candidates are urgently needed. Fortunately, NMES is the one. In this study, we investigated the effect of NMES in patients with PPLBP.

Currently, to our best knowledge, no clinical study specifically explored the effect of NMES in Chinese patients with PPLBP. Two related clinical trials only reported the effect of NMES for treating patients with LBP.[31,32] One study evaluated the feasible effect of a trunk muscle training (TMT) program augmented with NMES for treating the elderly with LBP.[31] Its results found that TMT and NMES may benefit for the patients with LBP. The other study also found that NMES can relieve pain for patients with chronic LBP, and plays a very important role in chronic LBP rehabilitation.[32]

Table 3

Comparisons of quality of life before and after treatment (n = 67).

WHOQOL-BREF	Before treatment	After treatment	*P*
Physical	13.7 (3.1)	14.1 (3.4)	.48
Psychological	12.4 (2.8)	12.6 (3.1)	.70
Social relationships	12.1 (3.4)	12.5 (3.8)	.52
Environment	13.2 (2.6)	13.3 (2.9)	.83
Overall quality of life	12.9 (3.5)	13.1 (3.7)	.75

Data are present as mean ± standard deviation.
WHOQOL-BREF = World Health Organization Quality of Life questionnaire.

This study was the first to investigate the effect of NMES in Chinese patients with PPLBP. In this study, our results did neither exert a promising effect in pain PPLBP relief, measured by the VAS, nor the functional status, measured by RMDQ, and quality of life, measured by WHOQOL-BREF. After 4-week treatment, our results did not show significant improvements of all outcome measurements, when compared with those before the treatment. The negative effect may be result from the low dose of NMES, and also the short treatment period.

Limitations of our study included, first, this study used low dose of NMES, with 30-minute treatment daily, once weekly for 4 weeks, which may affect our results and may be the possible reason to account for the ineffectiveness of NMES. Second, this study only included a 4-week period of treatment, which is a relatively short-term intervention to conclusively validate our findings, and may be the other reason to contribute to the ineffectiveness of NMES. Third, this study did not consist of a control group; thus, future studies should include a control intervention to further investigate this therapy for PPLBP.

5. Conclusion

The results of this study demonstrated that NMES is ineffective to patients with PPLBP. Future studies should include longer treatment period to further explore its effect.

Author contributions

Conceptualization: Yu-hang Zhao, Yue-peng Li, Shi-hua Zhang.
Data curation: Yu-hang Zhao, Yue-peng Li, Shi-hua Zhang.
Formal analysis: Xue Cui, Shi-hua Zhang.
Investigation: Xue Cui.
Methodology: Xue Cui.
Project administration: Yu-hang Zhao, Shi-chen Liu.
Resources: Yu-hang Zhao, Yue-peng Li, Shi-chen Liu.
Software: Xue Cui, Shi-hua Zhang.
Supervision: Shi-chen Liu.
Writing – original draft: Yu-hang Zhao, Yue-peng Li, Xue Cui, Shi-chen Liu, Shi-hua Zhang.
Writing – review & editing: Yu-hang Zhao, Yue-peng Li, Xue Cui, Shi-chen Liu, Shi-hua Zhang.

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