



POSTPARTUM SLEEP PHYSIOLOGY: RANDOMIZED CONTROLLED CLINICAL TRIAL

The effects of Pilates exercise on sleep quality in postpartum women



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KEYWORDS

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Summary Prolonged poor sleeping quality can decrease women's ability to perform their maternal and family duties after delivery. The aim of this study was to investigate the effects of a Pilates training program on sleep quality in primigravida postpartum women in a randomized clinical trial. Eighty postpartum women were randomly divided into intervention and control groups ($n = 40$). Home-based 30-min Pilate's exercises were started 72 h after the delivery and performed five times per week for consecutive 8 weeks. Sleep quality was assessed by the Pittsburgh Sleep Quality Index (PSQI) prior to the intervention and 4th and 8th weeks afterwards. The intervention group showed a significant improvement in subjective sleep quality, sleep latency, daytime dysfunction and global PSQI score ($P < 0.001$); however, there was no difference in sleep duration, habitual sleep efficiency and sleep disturbance between the groups. In conclusion, Pilates exercises appeared to improve sleep quality in primigravida postpartum women. © 2013 Elsevier Ltd. All rights reserved.

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Introduction

During the postpartum period, there are significant changes in not only the physical and mental health of the mothers, but also the family structure (Ko et al., 2008). Most women, especially primiparous women, experienced significant disturbance in their sleep patterns, due to hormonal changes and newborn care responsibilities (Heh et al., 2008). Sleep deprivation significantly affects concentration, judgment and daily activities of these mothers (Hosseinabadi et al., 2010). See Figs. 1–15 in Appendix A, preceding the reference list.

The disturbance of sleep cycle during postpartum period might last for several weeks or months. If it persists or worsens, it may negatively affect breastfeeding and reduce mother-infant bonding (Gunderson et al., 2008). Consequently, poor sleep quality, stress, mood sway, and depression may also occur in the mothers and their family members (Posmontier, 2008; Dennis and Ross, 2005).

There are a limited number of studies on the interventions to improve sleep quality during the postpartum period. It has been reported that 30 min of foot reflexology for five consecutive days can significantly improve sleep quality in postpartum women (Yen Li et al., 2011). In another study, inhaling lavender and eucalyptus for six consecutive days can also significantly improve postpartum sleep quality (Lee, 2004). However, these studies only assessed the short-term effects and none has studied the long term impact of any interventions on sleep quality improvement. Due to the nature of persisting sleep deprivation after childbirth, a regular home-based intervention program is necessary in order to improve sleep quality of the mothers.

Wide-spectrum epidemiological studies have suggested physical exercise as a non-medical intervention to ameliorate sleep disorders in order to improve sleep quality (Driver and Taylor, 2000); Although there are different exercise options it seems that activities that induce muscular relaxation and relieve fatigue are more appropriate than other aerobic exercises.

Pilates exercises have gained significant popularity among the general population in the past a few years (von Sperlingde Souza and Brum Vieira, 2006). These exercises benefit both physical and mental health by improving body flexibility, as well as increasing muscular balance and strength (Caldwell et al., 2009; Bernardo, 2007). Previous studies have reported a significant improvement in sleep quality after performing 12–15 week long Pilates exercises (Leopoldino et al., 2012; Caldwell et al., 2009, 2010).

Therefore, the current study aimed to evaluate the effect of 8 weeks of Pilates exercises on sleep quality in postpartum women.

Method

Ethics approval and subjects

This study was approved by the Human Ethics and Care Committee at Tehran University of Medical Sciences (HECE No. 10301) and Iranian Registry of Clinical Trials (IRCT No. 201102275912N2).

A randomized controlled clinical trial was carried out to determine the effects of eight-week Pilates exercises on postpartum sleep quality in primigravida. A total of 80 pregnant women who had been referred to the Health Care Centers of Rafsanjan, Iran, for prenatal care were selected. Out of 7 health centers, 4 centers were randomly selected through randomized block-level sampling to select the participants in the intervention group. Participants in the control group were selected from the same centers.

The study was carried out from April 2009 to September 2009. The inclusion criteria were Iranian, age between 18–35 years, primigravida, vaginal delivery, and full term delivery, as well as no history of physical or mental diseases or drug abuse. Participants all signed an informed consent form. The criteria to exclude participants included immigrants, suffering from postnatal depression (Edinburgh postnatal depression score ≤ 10), hospitalization of the infants, and failure to perform the exercises for 3 consecutive sessions, or having more than 5 interrupted sessions.

Considering the power at 8% and significance level at 5%, the minimum number of participants in each group was 33, with the assumption of 20% drop-out rate. Eventually 80 women were selected for data analysis, with 40 in each group. Due to the home-based intervention nature of this study, the study was carried out as an open clinical trial, which involves voluntary participation.

Pilates exercises

In this study, Pilates exercises exclusively for postpartum women were selected from two reference books, *Fitness Professional's Handbook and Guide Women's and Fitness Health*, which include 13 movements: Bridging, Hundred, Roll Up, One Leg Circle (both ways), Rocker with close legs, Single Straight Leg Stretch, Double Leg Stretch, Spine Stretch Forward, Single Leg Kick, Side Kick up and down, Side Kick circles, Rest position (stretch and relaxation) and Curling. There were sessions of warming up and cooling down prior to and after the Pilates exercises (See supplementary in the appendix). Flexion-extension movements, focusing on deep breathing and whole body stretches, were included in our Pilates exercises protocol. The risk assessment of Pilates exercises for postpartum woman were approved by experts in sport physiology, who considered them to represent a minor risk.

The participants started Pilates exercises 72 h to 1 week after delivery and continued for 8 weeks. The exercises were carried out early in the mornings for 30 min after breastfeeding, five days a week (preferably consecutively), according to the recommendations of the American College of Obstetricians and Gynecologists. The repetition and intensity of exercises were gradually increased throughout the program. In the first week, all 13 movements were repeated 3–5 times per session. Then two more repetitions of each movement were added, so that all the movements was repeated 10 times in the fourth week, which persisted until the end of the study. The intensity of the movements was increased gradually during the program.

Three weeks prior to the due date, the participants in the intervention group were trained in four sessions by a professional trainer in sport physiology and through training videos. They were also given an educational pamphlet and a CD for self-

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