



Effects of Pilates Exercises to Depression and Sleep Quality on the Postpartum Period: A Randomized Controlled Study

Pilates Egzersizlerinin Doğum Sonu Dönemde Depresyon ve Uyku Kalitesine Etkisi: Randomize Kontrollü Bir Çalışma

Halil Ibrahim BULGUROGLU¹ , Merve BULGUROGLU¹ , Cansu GEVREK ASLAN² 

¹Ankara Medipol University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation, Ankara, Turkey

²Ankara Medipol University, Vocational School of Health Services, Department of Therapy and Rehabilitation, Programme of Physiotherapy, Ankara, Turkey

ORCID ID: Halil Ibrahim Bulguroglu 0000-0002-6767-7062, Merve Bulguroglu 0000-0002-5923-4720, Cansu Gevrek Aslan 0000-0003-0750-3033

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Corresponding Author
Halil Ibrahim Bulguroglu

E-mail
fztibrahim@hotmail.com

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ABSTRACT

Aim: Postpartum is one of the most critical processes in women. Many changes occur in the female body during this process. Exercise is the easiest method to manage these changes. Our study aimed to understand how postpartum depression, sleep quality, and functional levels affect women who perform pilates exercises.

Material and Methods: In this randomized controlled study, 57 postpartum volunteer women between six weeks and six months, aged 25-38, with a single baby, were randomly included in 28 pilates and 29 control groups. The pilates group was given pilates exercises for one hour a day, two days a week for 12 weeks, by a physical therapist. The control group was given a home program consisting of relaxation and breathing exercises. Before and after the study, depression was evaluated using the Edinburgh Postpartum Depression Scale (EPDS), sleep quality, the Postpartum Sleep Quality Scale (PSQS), and postnatal functional levels, the Inventory of Functional Status After Childbirth (IFSAC) was evaluated using the questionnaire form-filling method.

Results: EPDS (8.71±1.42 versus 7.06±1.21, p=0.001), PSQS (25.69±3.40 versus 22.91±3.04, p=0.001), IFSAC (2.47±0.41 versus 2.93±0.21, p=0.001) scores statistically significant improvements were observed in pilates group. While the control group did not show a significant difference in depression levels (8.85±1.50 versus 8.95±1.23, p=0.479), statistically worsening of sleep quality (26.17±3.41 versus 27.59±2.94, p=0.009) and postpartum functional level parameters were observed (2.65±0.42 versus 2.48±0.46, p=0.016).

Conclusion: The results showed that 12-week pilates exercises applied during the postpartum period could improve postpartum women's functional levels, depression levels, and sleep quality.

Keywords: Pilates exercises, postpartum period, postpartum depression, sleep quality

ÖZ

Amaç: Doğum sonrası dönem kadınlar için en kritik süreçlerden biridir. Bu süreçte kadın vücudunda birçok değişiklik meydana gelir. Egzersiz, bu değişiklikleri yönetmenin en kolay yöntemidir. Çalışmamız, pilates egzersizi yapan kadınların doğum sonrası depresyon, uyku kalitesi ve fonksiyonel düzeylerinin nasıl etkilendiğini anlamayı amaçlamaktadır.

Gereç ve Yöntemler: Randomize kontrollü çalışmamızda, 25-38 yaş arası, tek bebeği olan 28 pilates ve 29 kontrol grubunda rastgele olacak şekilde 57 postpartum gönüllü kadın dahil edildi. Pilates grubuna 12 hafta boyunca haftada iki gün, günde bir saat fizyoterapist tarafından pilates egzersizleri verildi. Kontrol grubuna gevşeme ve nefes egzersizlerinden oluşan 12 haftalık ev programı verildi. Çalışma



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öncesi ve sonrasında doğum sonrası depresyon; Edinburgh Postpartum Depresyon Ölçeği ile (EPDÖ), uyku kalitesi; Postpartum Uyku Kalitesi Ölçeği (PUKÖ) ve fonksiyonel düzey; Doğum Sonrası Fonksiyonel Durum Envanteri (DSFDE) ile değerlendirildi.

Bulgular: Pilates grubunda EPDÖ (8,71±1,42'ye karşı 7,06±1,21, p=0,001), PUKÖ (25,69±3,40'a karşı 22,91±3,04, p=0,001), DSFDE (2,47±0,41'e karşı 2,93±0,21, p=0,001) skorlarında istatistiksel olarak anlamlı iyileşmeler gözlemlendi. Kontrol grubu depresyon düzeylerinde anlamlı fark göstermezken (8,85±1,50'ye karşı 8,95±1,23, p=0,479), uyku kalitesi (26,17±3,41'e karşı 27,59±2,94, p=0,009) ve doğum sonrası fonksiyonel düzey parametrelerinde istatistiksel olarak bozulmalar gözlemlendi (2,65±0,42'ye karşı 2,48±0,46, p=0,016).

Sonuç: Sonuçlar, doğum sonrası dönemde uygulanan 12 haftalık pilates egzersizlerinin kadınların postpartum fonksiyonel düzeylerini, depresyon düzeylerini ve uyku kalitelerini iyileştirebileceğini göstermiştir.

Anahtar Sözcükler: Pilates egzersizleri, postpartum dönem, postpartum depresyon, uyku kalitesi

INTRODUCTION

The postpartum period is when a new member joins the family, and the mother tries to adapt to her baby, postpartum discomforts, and changes in body image (1). Significant changes can be observed in postpartum mothers' physical and mental states (2). Especially women who experience motherhood for the first time, they may not be able to adapt to the changes that occur, and they may experience many significant disorders, especially depression and sleep disorders (3).

Postpartum depression, which affects 20% of postpartum women worldwide, is increasing day by day (4). It is known that there is a relationship between postpartum depression and functionality and sleep quality (3,5). Along with depressed mood in the postpartum period, frequent feeding at night and postpartum pain affect sleep quality (6). The National Sleep Foundation reports that most new parents have an insufficient sleep (7). Sleep problems cause mother to a lack of concentration, increased depression, and difficulties in daily activities (8). Disruption of the sleep cycle in the first period of motherhood can be considered normal, but if this cycle lasts for months or worsens, it may affect both infant care and self-care of the mother and reduce the mother-infant bond. New mothers' poor sleep quality and depressed mood increase the risk of anxiety and impair their functional levels (9). During this period, the mother needs special effort and energy for her new process (10). Mothers defined the postpartum period as a period that causes changes in their own and familial functions (2,5). The earlier the women can increase her functional status, the more her self-efficacy will increase (11). The functional status of women after childbirth gradually decreases. The decrease in this level of functionality may come to a level that will affect both maternal health and infant care (12). Especially the decrease in sleep duration and quality can reduce the energy of mothers in the next day (13). In this process, the functional levels of fathers, who are the biggest supporters of mothers, may also be negatively affected. This situation, which may cause an increase in depressive situations in the family, may worsen the process of the mother (14).

Inactivity, which is common in today's world, can increase the risk of various problems for new mothers. These problems can negatively affect postpartum women's depression, functional level, and sleep quality (15). Exercise increases the number of beta-endorphins, which increase energy and reduce feelings of anger, confusion, depression, fatigue, and irritability (16,17). Especially after the first birth, baby care and other problems may decrease the participation rate in exercise. It is known that regular physical activity during this period will accelerate the physical recovery of the mother and positively affect her mood and other problems (18). All these effects make it easier for mothers to perform their daily activities (19).

The published guidelines state that women should do moderate-intensity exercise for at least 150 minutes a week after giving birth (20). Given the processes in the postpartum period, the Pilates method is one of the most well-known and reliable exercise programs worldwide for babies and mothers (21-23). However few studies have examined the effect of pilates exercises on sleep quality and depression levels in the postpartum period (24-27). Ko et al. applied an exercise program consisting of yoga and pilates exercises for 12 weeks and stated that the depression levels of mothers decreased (24). In another study, it was observed that the level of depression in postpartum women decreased after performing an exercise program consisting of pilates and yoga exercises for ten weeks (25). A study concluded that pilates exercises performing for eight weeks increased sleep quality in postpartum women (26). In another study, eight pregnant women were given 8-week online pilates exercises during their pregnancy. Positive developments were observed in evaluating depression and sleep quality in the eighth week after birth (27). Methodological deficiencies are evident in all these studies, and it is emphasized in the results that methodologically strong, randomized controlled studies should be conducted in the future. Considering that the problems may increase with the decrease in the mother's functionality level (28), the functionality of the mother is indispensable for the mother-child relationship. In the literature, few studies evaluate the relationship between the functionality level of the mother and pilates exercises.

Therefore, this study aims to determine the effects of pilates exercises performed with a physiotherapist in the postpartum period on depression, sleep quality, and functional levels of women.

MATERIAL and METHODS

Participants

Sixty-three postpartum volunteer women who applied to physiotherapy unit between May and June 2022 agreed to participate in the study and had no problem exercising during the postpartum examinations performed by the obstetrician were invited to our study, which we planned as a randomized controlled study. Three women did not meet the inclusion criteria, and two declined to participate. In conclusion, our study started with fifty-eight postpartum women. One of the participants in the Pilates group did

not complete the study due to personal reasons, and as a result, our study was completed fifty-seven postpartum. The flow of participants is illustrated in Figure 1 in line with the CONSORT 2010 guidelines (29). All methods related to our study, which we conducted in accordance with the Declaration of Helsinki, were performed according to the CONSORT 2010 guidelines (Clinical Trials.gov Number NCT05397808, First Posted: 31/05/2022). Ethics committee approval was obtained from Ankara Medipol University Non-Interventional Clinical Research Ethics Committee (dated 23/05/2022, decree no: 0108).

The inclusion criteria were defined as being between six weeks and six months postpartum, being between 25-38 years old, giving birth for the first time, having a single baby, having a vaginal delivery, and not having any birth anomaly in herself or the baby. Women with multiple pregnancies

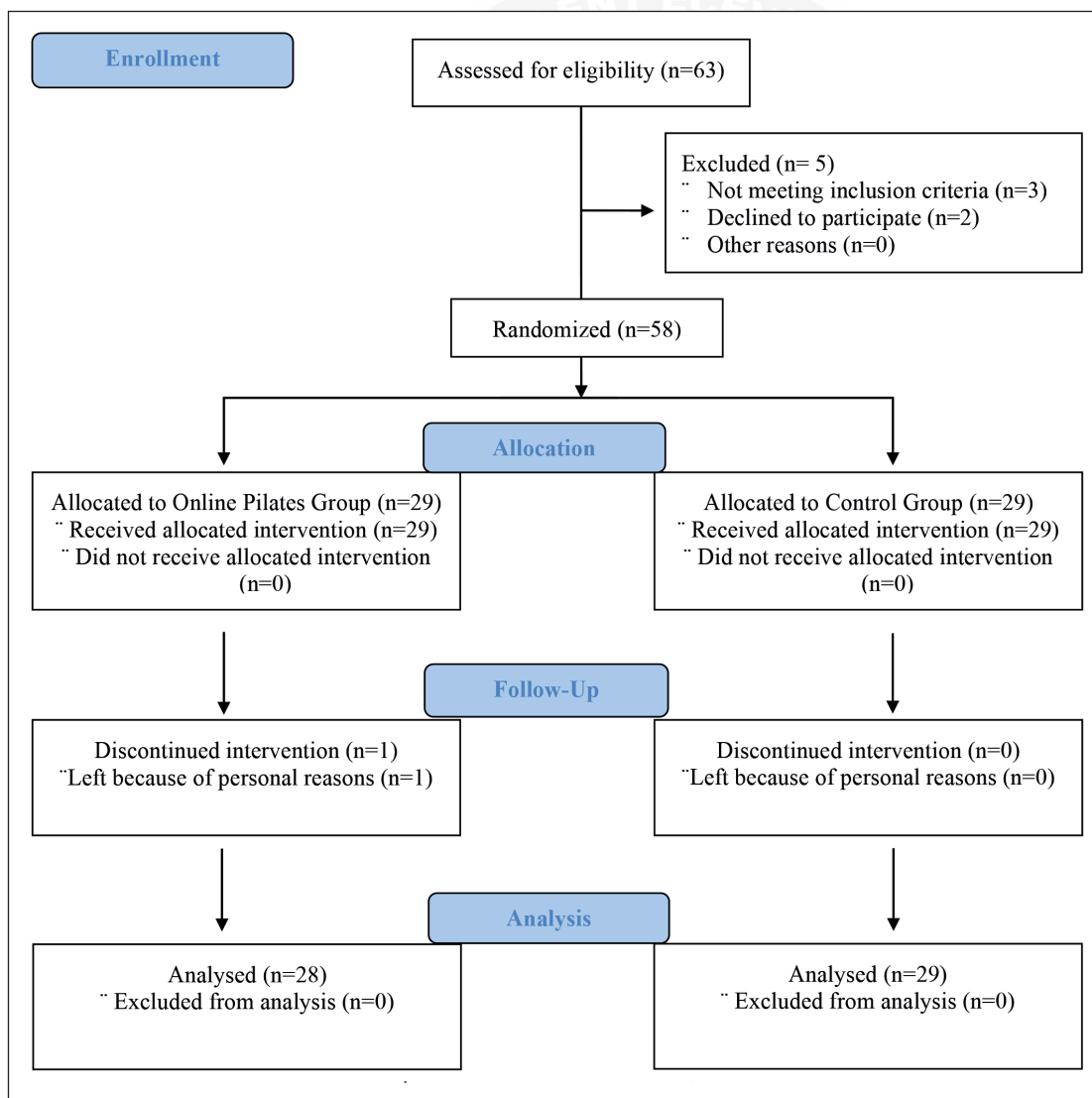


Figure 1: Flow diagram showing patient randomization and allocation processes.

and chronic diseases such as hemodynamically significant heart disease, restrictive lung diseases, diabetes, and hypertension were excluded from the study. Participants who participated in different activities or physiotherapy programs were excluded from the study.

In the power analysis to determine the sample size, to detect an effect size of Cohen’s $d=0.80$ with 80 power ($\alpha=.05$, two-tailed), G* Power version 3.1 suggested needing 26 participants per group in an independent samples t-test (30). 58 postpartum volunteer women (29 exercise group and 29 control group) were included in the study, considering the 10% dropout assumption.

Procedures

Before the study, its purpose and content were explained to the participants. Participants were assessed twice, at the beginning and end of the study, by an experienced blind physiotherapist. Randomization was performed with a program that generates random numbers (random.org) (24). Individuals who completed the initial assessment were randomly assigned to the pilates (PG) or control group (CG). The examiner and staff who performed the statistical analyses were blinded to the group assignment. In the final evaluation, the participants were asked not to report their participation in the training to the evaluator.

Intervention

Pilates training was performed by a certified, experienced, study-blind physiotherapist for one hour twice a week for 12 weeks. The exercise program recommended by the Australian Pilates and Physiotherapy Institute in the postpartum period was performed to the participants 30 minutes after breastfeeding (31). Pilates group was divided into two groups so that Pilates exercises could be applied more effectively. Pilates exercises were applied for 45 minutes. Before and after the exercises, 15-minute warm-up and cool-down exercises were given. The exercises applied within the scope of the Pilates exercise program are given in Table 1. In the first session, the basic principles and key elements of pilates were taught to the individuals, and they were asked to pay attention to them throughout the exercises. Visual and verbal imagery techniques were used during

the exercise narrations. During the exercise, the individuals were carefully observed, and necessary corrections were made to the movements.

The individuals in the control group were given relaxation and breathing exercises as part of a twelve-week home program. After the initial evaluation, a 50-minute program consisting of diaphragmatic breathing, expansion exercises, and respiratory control was given. Their first practice was done under the supervision of the instructor and it was ensured that they understood thoroughly. In the 4th, 8th, and 12th weeks, they were called by phone to check whether they adhered to the program.

Participants stated they should interrupt the exercises when side effects such as shortness of breath, dizziness, and weakness were observed. These effects did not occur in any of the participants during the process.

Outcome Measurements

The individuals included in the study were evaluated using data collection forms filled out through the questionnaires. The demographic information of the participants was recorded. Additionally, depression levels, postpartum sleep quality, and postpartum functional levels were evaluated.

Depression symptoms were the primary outcome of the study, and the Turkish version of the Edinburgh Postpartum Depression Scale (EPDS) was used to determine the postpartum depression levels of individuals (32). This scale determines the risk of depression in women in the postpartum period (33). The Cronbach’s alpha value of the validity and reliability study of Aydin et al. was 0.72, while that of this study was 0.791. EPDS is a 10-item Likert-type self-report scale. Items 3, 5, 6, 7, 8, 9, and 10 gradually decrease strength and are scored as 3, 2, 1, and 0. Items 1, 2, and 4 are calculated as 0, 1, 2, and 3. The scale’s total score is obtained by adding the item scores together. The lowest score on the scale is 0, and the highest score is 30. A score of 13 and above indicates a risk of depression.

Sleep Quality and Postnatal functional levels of individuals were secondary outcomes of the study, assessed by the Postpartum Sleep Quality Scale (PSQS) and Inventory of Functional Status After Childbirth (IFSAC) (34,35). The PSQS is a scale that measures women’s sleep quality in the last two weeks postpartum. The items of the scale assess the duration of falling asleep, actual sleep time per night, difficulty falling asleep, waking up at midnight, waking up early in the morning, the effect of baby care and maternal physical state on sleep, feeling energetic throughout the day and satisfaction with sleep quality in the postpartum period. The items of the PSQS are scored between 0 and 4 on a 5-point Likert scale. The minimum score of the PSQS is 0, and the maximum available score is 56. Higher PSQS scores indicate worse sleep quality. The Turkish version of the scale

Table 1: Pilates exercises program

Movements	
1. Hundreds	2. Side Leg Lifts
3. Single Leg Circles	4. Arms Opening
5. Shoulder Bridge	6. Breaststroke Preparations
7. Single Leg Stretch	8. Swan
9. Clam	10. Swimming,
11. Sidekick	12. The Roll-Up.

(36) was used in our study. The Cronbach's alpha value of the validity and reliability study of Boz and Selvi was 0.88, while that of this study was 0.91. The IFSAC consists of five subscales, including five dimensions of functional status and 36 four-point Likert-type questions to determine postpartum recovery. These include domestic, social, and community activities; baby care responsibilities; self-care; and professional activities. The total score was calculated by dividing the scores of all answered items by the number of answered items. Each question on the IFSAC was evaluated over four points (one to four). A high score (close to four) indicates high functional status. The Turkish version of the IFSAC was used in our study. The Cronbach's alpha value of the validity and reliability study of Ozkan and Sevil was 0.79, while that of this study was 0.834 (37).

Statistical Analysis

Statistical analyses were performed using SPSS software, version 26 (SPSS Inc. Chicago, IL, USA). Visual (histogram, probability graphs) and analytical methods (Kolmogorov-Smirnov and Shapiro-Wilk tests) were used to determine whether the variables were normally distributed. Numerical variables with normal distribution are shown as mean \pm standard deviation. Independent sample t test is used for demographic characteristics. The Repeated Measure ANOVA test was used to compare the data of the study and control groups that changed over time, and the paired-sample t-test was used for in-group comparisons. The statistical significance level was set at $p < 0.05$ in all tests.

RESULTS

This study included 57 women. The two groups had similar demographic characteristics ($p > 0.05$, Table 2). Although there was no statistical difference between the initial and twelve weeks postpartum BMI values of the pregnant women in both groups ($p > 0.05$, Table 2), although the weeks progressed in the exercising group, the average BMI value of the participants decreased compared to the baseline (Table 2).

When the depression level results before and after the intervention were compared in the Pilates group, a statistically significant improvement was observed ($p < 0.05$, effect size = 1.31, Table 3), while no difference was found in the control group ($p > 0.05$, Table 3). When the sleep quality measurements before and after the Pilates group were compared, a statistically significant improvement was observed ($p < 0.05$, effect size = 0.989, Table 3), while a statistically negative difference was found in the control group ($p < 0.05$, Table 3). A statistically significant improvement was observed in the Pilates group before and after the measurements of the postpartum functional level parameters ($p < 0.05$, effect size = 1.28, Table 3), while a statistically negative difference was found in the control group ($p < 0.05$, Table 3).

In Table 4, a statistically significant difference was found with a large effect size in favor of the pilates group when the changes in the before and after depression level results of the study and control groups were compared ($F = 39.753$; $p < 0.001$, $\eta^2 = 0.429$).

In Table 4, a statistically significant difference was found with a large effect size in favor of the pilates group when the changes in the study and control groups before and

Table 2: Demographic characteristics of the groups

Characteristics*	Intervention (n= 28)	Control (n= 29)	p ^a
Age (years)	27.23 \pm 3.78	28.12 \pm 3.52	0.321
Height (cm)	165 \pm 5.45	166 \pm 4.83	0.132
Weight (kg)	72 \pm 4.8	74 \pm 5.11	0.674
BMI-1 (kg/cm ²)	25.34 \pm 4.81	25.89 \pm 5.14	0.532
BMI-2 (kg/cm ²)	24.21 \pm 3.79	26.94 \pm 4.92	0.187
Postpartum week	14.11 \pm 5.79	15.03 \pm 4.67	0.742

*Data are whown as mean \pm standart deviation.

a: Independent sample t test, SD: Standart deviation, cm: centimeters, kg: kilograms, BMI: body mass index, PG: Pilates group, CG: Control group, n: sample size.

Table 3: A comparison of the previous and subsequent measurement of depression, sleep quality, and postnatal functional levels for pilates and control groups

Measurements*	Groups	Pre-test	Post-test	p ¹	Effect Size
EPDS (0-30)	PG	8.71 \pm 1.42	7.06 \pm 1.21	0.001**	1.31
	CG	8.85 \pm 1.50	8.95 \pm 1.23	0.479	0.97
PSQS (0-56)	PG	25.69 \pm 3.40	22.91 \pm 3.04	0.001**	0.989
	CG	26.17 \pm 3.41	27.59 \pm 2.94	0.009**	0.528
IFSAC (0-4)	PG	2.47 \pm 0.41	2.93 \pm 0.21	0.001**	1.28
	CG	2.65 \pm 0.42	2.48 \pm 0.46	0.016**	0.485

*Data are whown as mean \pm standart deviation.

**p < 0.05, 1: paired samples t-test. SD: Standart deviation, PG: Pilates group, CG: Control group, EPDS: Edinburgh Postpartum Depression Scale, PSQS: Postpartum Sleep Quality Scale, IFSAC: Inventory of Functional Status After Childbirth.

Table 4: Comparison of the data of the study and control groups that changed over time

Scales*	Groups	Pre-test	Post-test	p	η^2
EPDS	PG	8.71±1.42	7.06±1.21	<0.001**	0.429
	CG	8.85±1.50	8.95±1.23		
PSQS	PG	25.69±3.40	22.91±3.04	<0.001**	0.375
	CG	26.17±3.41	27.59±2.94		
IFSAC	PG	2.47±0.41	2.93±0.21	<0.001**	0.453
	CG	2.65±0.42	2.48±0.46		

*Data are whown as mean±tandard deviation.

p < 0.05, Repeated Measures Anova Test, η^2 : partial eta squared, **PG: Pilates group, **CG**: Control group, **EPDS**: Edinburgh Postpartum Depression Scale, **PSQS**: Postpartum Sleep Quality Scale, **IFSAC**: Inventory of Functional Status After Childbirth.

after sleep quality measurement results were compared ($F=31,865$; $p<0.001$, $\eta^2=0.375$). In Table 4 examined, a statistically significant difference was found with a large effect size in favor of the pilates group when the changes in the study before and after postpartum functional level results and control groups were compared ($F=43,824$; $p<0.001$, $\eta^2 =0.453$).

DISCUSSION

This study showed that pilates exercises administered to postpartum women could reduce depression and improve sleep quality and postnatal functionality. Although few studies have shown the effects of pilates exercises specifically involved in the postpartum period on postpartum depression, studies have shown that exercise combinations, including pilates exercises, are effective in postpartum depression (24,25,27). In addition, it has been stated in the literature that women can benefit from cognitive behavioral therapy, interpersonal therapy, and psychodynamic psychotherapy (38) to reduce depression levels, and that education programs given in the prenatal period can also be effective (39).

In their study of 23 postpartum women, Ko et al. stated that the exercise program, including pilates and yoga exercises, had a statistically significant effect, especially in women with high depression levels (24). Another study using a combination of pilates, yoga, and elastic band exercises showed that postpartum depression decreased after ten weeks of training (25). Kim and Hyun showed that 8-week pilates training during pregnancy could be effective in the postpartum period (27). However, the most important limitations of these studies are the small number of participants in the research and the absence of a comparable control group. In addition, the inclusion criteria of these studies lacked an expression of the mode of delivery and trauma that may occur at birth. The mode of delivery and trauma that may occur during and after birth can seriously affect the level of depression in postpartum women (28). Therefore, to make our research more reliable, those who

gave birth by cesarean section and traumas that occurred during or after delivery were excluded from our research. Previous studies report that regular exercise effectively manages stress, reduces depression, and improves personal self-esteem and body image (40). When pilates exercises are applied together with the breathing techniques in their nature, it helps individuals feel more energetic and fit (41). In addition, women may feel more alone during the new motherhood process. Socializing with other mothers and interacting with the instructor can reduce these feelings and reduce the level of depression (42). Therefore, we interfere that the decrease in depression levels in our study is because the women exercised regularly for 12 weeks and socialized with others during the exercise.

We observed that 12 weeks of pilates training improved the sleep quality of postpartum women. Although there is only one study in the literature on the effect of pilates exercises on postpartum sleep quality (26), methods such as cognitive behavioral therapy and light-dark therapy were found to be effective in reducing sleep problems (43).

Ashrafinia et al. observed that the sleep quality of postpartum women improved with eight weeks of pilates training in their study (26). They also emphasized the importance of pilates exercises to maintain physical and mental health postpartum. The most crucial difference between Ashrafia et al.'s and ours is that our study used a postpartum process specific sleep quality scale. Therefore, we think that sleep problems can be better examined, particularly during the postpartum period. In our study, we observed that the sleep quality of the pilates group improved positively, while that of the control group was negatively affected as the weeks progressed. It is common for the mother's sleep quality to deteriorate with the new period. The sleep problem seen during the new motherhood period is one of the critical problems that may affect the mother-baby and mother-family harmony that can be seen in the mother (44). In the literature, methods such as cognitive behavioral therapy and Light dark therapy have been used and found effective to reduce sleep problems (43). The improvement in sleep quality,

which is one of the essential parts of the result we obtained with our study, will also facilitate the daily life functions of mothers. Breathing exercises used in Pilates exercises help the individual calm down (45). In addition, the physical benefits of pilates exercises help the mother feel more vigorous and gain self-confidence (26). All of these may have helped improve the mother's sleep quality. In addition, pilates exercises comfort the mother by improving her mental health, contributing to increased sleep quality.

In our study, positive improvements were observed functional levels of mothers in the Pilates group at the end of 12 weeks. In contrast, functional levels of mothers in the control group worsened. Although there are no studies in the literature showing how exercise affects the postpartum functional level of the mother, few studies have shown the effects of various methods on the postpartum functional level (39,46-48). In these studies, postnatal and skills training approaches improve postnatal functional levels. In addition, It has been shown in the literature that physical activity during pregnancy and antenatal education may not affect postpartum functionality (39,49). Mothers with a high level of functionality also have a high level of maternal attachment. Social and psychological supports contribute to increasing functionality and motherly affection (48). It is also known that women with postpartum depression have a lower level of functionality (5). Pilates exercises reduce mothers' depression levels¹ and increase their functional capacity by providing physical recovery (24,25). With the self-confidence provided by the training, the mother, moves more quickly. In addition, Pilates exercises minimize the painful problems seen in the postpartum period (50). All these developments may have increased the mother's level of functionality and allowed her to adapt to motherhood and her own life more quickly.

One of the strengths of our study was that it was a randomized controlled trial. Another strength of our study is that it is the first to evaluate the effect of exercise on the functional level of the mother. The questionnaires used in the study were pregnancy-specific, and the inclusion and exclusion criteria were well-defined compared to other studies. The most important limitation of our study is the lack of postpartum care training and exercise training. Another limitation of our study is that its relationship with IFSAC sub-dimensions was not examined. In addition, studies with larger samples are needed to examine the effects of different exercise methods on postpartum women. However, examining the effects of exercise programs that can be applied online in the postpartum period, considering the newborn baby and other situations, is necessary.

In conclusion, motherhood was one of the holiest periods for women. During this period, supporting the mother and ensuring the mother-child relationship is very important.

This study shows the importance of pilates training for mothers to maintain their functions and social participation by gaining healthy habits. Therefore, our study can guide physiotherapists and the literature. Pilates exercise training reduces depression levels in postpartum women and increases sleep quality and functionality. Future studies should examine the effects of different exercise methods in postpartum women.

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Author Contributions

Concept: **Halil İbrahim Bulguroğlu**, Design: **Halil İbrahim Bulguroğlu**, Data collection or processing: **Merve Bulguroğlu**, **Cansu Gevrek Aslan**, Analysis or Interpretation: **Merve Bulguroğlu**, **Cansu Gevrek Aslan**, Literature search: **Halil İbrahim Bulguroğlu**, **Merve Bulguroğlu**, **Cansu Gevrek Aslan**, Writing: **Halil İbrahim Bulguroğlu**, **Merve Bulguroğlu**, **Cansu Gevrek Aslan**.

Conflicts of Interest

The authors have no conflicts of interest to declare.

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Ethical Approval

The research project was approved with the decision of Ankara Medipol University Non-Interventional Clinical Research Ethics Committee (dated 23/05/2022, decision no: 0108).

Review Process

Extremely peer-reviewed and accepted.

REFERENCES

1. Asadi M, Noroozi M, Alavi M. Identifying women's needs to adjust to postpartum changes: A qualitative study in Iran. *BMC Pregnancy Childbirth* 2022;22(1):115.
2. Ghanbari-Homayi S, Fardiazar Z, Meedya S, Mohammad-Alizadeh-Charandabi S, Asghari-Jafarabadi M, Mohammadi E, Mirghafourvand M. Predictors of traumatic birth experience among a group of Iranian primipara women: A cross sectional study. *BMC Pregnancy Childbirth* 2019;19(1):1-9.
3. Norhayati MN, Hazlina NH, Asrenee AR, Emilin WM. Magnitude and risk factors for postpartum symptoms: A literature review. *J Affect Disord* 2015;175:34-52.
4. Ghaedrahmati M, Kazemi A, Kheirabadi G, Ebrahimi A, Bahrami M. Postpartum depression risk factors: A narrative review. *J Educ Health Promot* 2017;6:60.
5. Posmontier B. Functional status outcomes in mothers with and without postpartum depression. *J Midwifery Womens Health* 2008;53(4):310-318.
6. McBean AL, Kinsey SG, Montgomery-Downs HE. Effects of a single night of postpartum sleep on childless women's daytime functioning. *Physiol Behav* 2016;156:137-147.

7. Hirshkowitz M, Whiton K, Albert SM, Alessi C, Bruni O, DonCarlos L, Hazen N, Herman J, Katz ES, Kheirandish-Gozal L, Neubauer DN, O'Donnell AE, Ohayon M, Peever J, Rawding R, Sachdeva RC, Setters B, Vitiello MV, Ware JC, Adams Hillard PJ. National Sleep Foundation's sleep time duration recommendations: Methodology and results summary. *Sleep Health* 2015;1(1):40-43.
8. Montgomery-Downs EH, Stremler R, Insana PS. Postpartum sleep in new mothers and fathers. *Open Sleep J* 2013;6(1):87-97.
9. Saxbe DE, Schetter CD, Guardino CM, Ramey SL, Shalowitz MU, Thorp J, Vance M. Sleep quality predicts persistence of parental postpartum depressive symptoms and transmission of depressive symptoms from mothers to fathers. *Ann Behav Med* 2016;50(6):862-875.
10. Warren LP. First-time mothers: Social support and confidence in infant care. *J Adv Nurs* 2005;50(5):479-488.
11. Fathi F, Mohammad-Alizadeh-Charandabi S, Mirghafourvand M. Maternal self-efficacy, postpartum depression, and their relationship with functional status in Iranian mothers. *Women Health* 2018;58(2):188-203.
12. Özkan S, Göral-Türkoü S, Kayhan Ö, Serçekeuş-Ak P, Sevil Ü. Functional status of women and their partners after childbirth. *Int J Assess Tools Educ* 2018;5(3):510-523.
13. Eck KM, Santiago E, Martin-Biggers J, Byrd-Bredbenner C. Maternal sleep quality is associated with personal and parenting weight-related behaviors. *Int J Environ Res Public Health* 2020;17(15):5312.
14. Yogman MW, Eppel AM. The Role of Fathers in Child and Family Health. In: Grau Grau M, las Heras Maestro M, Riley Bowles H (editors). *Engaged Fatherhood for Men, Families and Gender Equality: Contributions to Management Science*, Springer, Cham:Switzerland, 2022: 279-295.
15. Demissie Z, Siega-Riz AM, Evenson KR, Herring AH, Dole N, Gaynes BN. Associations between physical activity and postpartum depressive symptoms. *J Womens Health (Larchmt)* 2011;20(7):1025-1034.
16. Basso JC, Suzuki WA. The effects of acute exercise on mood, cognition, neurophysiology, and neurochemical pathways: A review. *Brain Plast* 2017;2(2):127-152.
17. Acar M, Yarımkaaya NS, Tekindal MA. The effect of nordic walking exercise training on physical fitness, physical activity level, anxiety-depression and quality of life in smokers: A randomized controlled trial. *Med J West Black Sea* 2022;6(3):385-393.
18. Kolomańska-Bogucka D, Mazur-Bialy AI. Physical activity and the occurrence of postnatal depression-A systematic review. *Medicina (Kaunas)* 2019;55(9):560.
19. Okyay EK, Ucar T. The effect of physical activity level at postpartum period on quality of life and depression level. *Med-Science* 2018;7:587-593.
20. Physical activity and exercise during pregnancy and the postpartum period: ACOG committee opinion, Number 804. *Obstet Gynecol* 2020;135(4):e178-e188.
21. Hoffman J, Gabel CP. The origins of Western mind-body exercise methods. *Phys Ther Rev* 2015;20(5-6):315-324.
22. Alkan E, Özçoban FA. Gebelik, doğum ve doğum sonu dönemde pilatesin etkileri. *Smyrna Tıp Dergisi* 2017; 7(2):2-30.
23. Urer E. Gebelikte pilates egzersizi yapma durumunun doğum sonu dönemde stres inkontinans üzerine etkisi. İstinye Üniversitesi, Sağlık Bilimleri Enstitüsü. Yayınlanmamış Yüksek Lisans Tezi, İstanbul, 2019.
24. Ko YL, Yang CL, Fang CL, Lee MY, Lin PC. Community-based postpartum exercise program. *J Clin Nurs* 2013;22(15-16):2122-2131.
25. Ko YL, Lin PC, Yang CL, Chen CP, Shih HJ. Pilot study on an integrated pilates and yoga program for decreasing postpartum depression in women. *Open J Nurs* 2015;5(10):885.
26. Ashrafinia F, Mirmohammadali M, Rajabi H, Kazemnejad A, Sadeghniaathaghighi K, Amelvalzadeh M, Chen H. The effects of pilates exercise on sleep quality in postpartum women. *J Bodyw Mov Ther* 2014;18(2):190-199.
27. Kim HB, Hyun AH. Psychological and biochemical effects of an online pilates intervention in pregnant women during COVID-19: A randomized pilot study. *Int J Environ Res Public Health* 2022;19(17):10931.
28. Slomian J, Honvo G, Emonts P, Reginster JY, Bruyère O. Consequences of maternal postpartum depression: A systematic review of maternal and infant outcomes. *Womens Health (Lond)* 2019;15:1745506519844044.
29. Schulz KF, Altman DG, Moher D; CONSORT Group. CONSORT 2010 statement: Updated guidelines for reporting parallel group randomised trials. *BMJ* 2010;340:c332.
30. Kang H. Sample size determination and power analysis using the G*Power software. *J Educ Eval Health Prof* 2021;18:17.
31. Klankhajhon S, Sthien A. A narrative review of physical activity and exercise during pregnancy: Nurse's role. *JPNS* 2022;1(2):49-60.
32. Aydin N, Inandi T, Yigit A, Hodoglugil NN. Validation of the Turkish version of the Edinburgh Postnatal Depression Scale among women within their first postpartum year. *Soc Psychiatry Psychiatr Epidemiol* 2004;39(6):483-486.
33. Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. *Br J Psychiatry* 1987;150:782-786.
34. Yang CL, Yu CH, Chen CH. Development and validation of the postpartum sleep quality scale. *J Nurs Res* 2013;21(2):148-54.
35. Fawcett J, Tulman L, Myers ST. Development of the inventory of functional status after childbirth. *J Nurse Midwifery* 1988;33(6):252-260.
36. Boz I, Selvi N. Testing the psychometric properties of the postpartum sleep quality scale in Turkish women. *J Nurs Res* 2018;26(6):385-392.
37. Ozkan S, Sevil U. Doğum sonrası fonksiyonel durum envanterinin geçerlilik güvenilirlik çalışması (in Turkish). [The study of validity and reliability of inventory of functional status after childbirth]. *TSK Koruyucu Hekimlik Bülteni* 2007;6(3):199-208.
38. Sharma V, Sharma P. Postpartum depression: Diagnostic and treatment issues. *J Obstet Gynaecol Can* 2012;34(5):436-442.
39. Gurkan OC, Eksi Z. Effects of antenatal education program on postpartum functional status and depression. *Clin Exp Health Sci* 2017;7:133-138.
40. Herbert C, Meixner F, Wiebking C, Gilg V. Regular physical activity, short-term exercise, mental health, and well-being among university students: The results of an online and a laboratory study. *Front Psychol* 2020;11:509.

41. Wells C, Kolt GS, Bialocerkowski A. Defining pilates exercise: A systematic review. *Complement Ther Med* 2012;20(4):253-262.
42. Corrigan CP, Kwasky AN, Groh CJ. Social support, postpartum depression, and professional assistance: A survey of mothers in the midwestern united states. *J Perinat Educ* 2015;24(1):48-60.
43. Verma S, Quin N, Astbury L, Wellecke C, Wiley JF, Davey M, Rajaratnam SMW, Bei B. Treating postpartum insomnia: A three arm randomised controlled trial of cognitive behavioural therapy and light dark therapy. *Psychol Med*. 2022:1-11.
44. Creti L, Libman E, Rizzo D, Fichten CS, Bailes S, Tran DL, Zekowitz P. Sleep in the postpartum: Characteristics of first-time, healthy mothers. *Sleep Disord* 2017;2017:8520358.
45. Fleming KM, Herring MP. The effects of pilates on mental health outcomes: A meta-analysis of controlled trials. *Complement Ther Med* 2018;37:80-95.
46. Chamgurdani FK, Barkin JL, Esmaeilpour K, Malakouti J, Buoli M, Mirghafourvand M. The effect of counseling with a skills training approach on maternal functioning: A randomized controlled clinical trial. *BMC Womens Health* 2020;20(1):51.
47. Bagherinia M, Mirghafourvand M, Shafaie FS. The effect of educational package on functional status and maternal self-confidence of primiparous women in postpartum period: A randomized controlled clinical trial. *J Matern Fetal Neonatal Med* 2017;30(20):2469-2475.
48. Mirghafourvand M, Mohammad-Alizadeh-Charandabi, S, Jafarabadi MA, Soltanpour S, Aghamiri V, Bagherinia, M. Physical activity during pregnancy and its relationship with the functional status of primiparous women six weeks after childbirth: A cohort study. *JCDR* 2018;12(11):QC12-QC16.
49. Mirghafourvand M, Bagherinia M. Relationship between maternal self-efficacy and functional status four months after delivery in Iranian primiparous women. *J Psychosom Obstet Gynaecol* 2018;39(4):1-8.
50. Mazzarino M, Kerr D, Wajswelner H, Morris ME. Pilates method for women's health: Systematic review of randomized controlled trials. *Arch Phys Med Rehabil* 2015;96(12):2231-2242.

