



## The effect of yoga nidra on pain, mobilization, first walking distance and care satisfaction after cesarean section: A randomized controlled trial

Yoga nidranın sezaryen sonrası ağrı, mobilizasyon, ilk yürüme mesafesi ve bakım memnuniyeti üzerine etkisi:  
Randomize kontrollü deneysel araştırma

Ayşegül Kılıçlı<sup>1</sup>, Aysel Doğan<sup>2</sup>

<sup>1</sup>Muş Alparslan University, Faculty of Health Sciences, Department of Nursing, Muş, Türkiye  
<sup>2</sup>Toros University, Faculty of Health Sciences, Department of Nursing, Mersin, Türkiye

### ABSTRACT

**Aim:** This study aims to investigate the effect of yoga nidra on pain, mobilization, first walking distance, and care satisfaction after cesarean section.  
**Methods:** This is a randomized controlled trial. Data were collected between 01 October–28 December 2023. Sample of the study consisted of 128 women (yoga nidra: 64, control: 64) who gave birth by cesarean section. Women were randomly assigned to the groups as 1:1. The yoga nidra group received a 30-minute yoga nidra session before the first mobilization after cesarean section. Yoga nidra was not applied to the control group. The primary outcomes of the study were the mean scores of the Visual Analogue Scale (VAS) for pain, Patient Mobility Scale (PMS), Observer Mobility Scale (OMS), and walking distance for mobilization, and Newcastle Satisfaction with Nursing Care Scale (NSNCS) for satisfaction.  
**Results:** In the yoga nidra group, the mean VAS pain score and the mean scores of PMS, OMS and sub-dimensions decreased more, women's mobilisation processes were more positively affected, women's mean first walking distance and their satisfaction with nursing care increased more than the control group ( $p<.05$ ).  
**Conclusion:** Yoga nidra can be used safely by midwives and nurses in postpartum care practices.

**Keywords:** cesarean section; mobilization; postoperative pain; yoga

### ÖZ

**Amaç:** Bu çalışmada yoga nidranın sezaryen sonrası ağrı, mobilizasyon, ilk yürüme mesafesi ve bakım memnuniyetine etkisini incelemek amaçlanmıştır.  
**Yöntem:** Bu randomize kontrollü deneysel bir araştırmadır. Veriler 01 Ekim-28 Aralık 2023 tarihleri arasında toplanmıştır. Çalışmanın örneklemini sezaryen ile doğum yapan 128 kadın (yoga nidra: 64, kontrol: 64) oluşturmaktadır. Kadınlar gruplara rastgele 1:1 olarak atanmıştır. Yoga nidra grubuna sezaryen sonrası ilk mobilizasyondan önce 30 dakikalık yoga nidra seansı bir kez uygulanmıştır. Kontrol grubuna yoga nidra uygulanmamıştır. Çalışmanın birincil sonuçları ağrı için Görsel Analog Skalası (VAS), mobilizasyon için Hasta Mobilite Skalası (PMS), Gözlemci Mobilite Skalası (OMS) ve yürüme mesafesi ve memnuniyet için Newcastle Hemşirelik Bakımından Memnuniyet Ölçeği (NSNCS) puan ortalamalarıdır.  
**Bulgular:** Yoga nidra grubunda kontrol grubuna göre ortalama VAS ağrı skoru ile PMS, OMS ve alt boyut ortalama skorlarının daha fazla azaldığı, kadınların mobilizasyon süreçlerinin daha olumlu etkilendiği, kadınların ortalama ilk yürüme mesafesi ve hemşirelik bakımından duydukları memnuniyetin daha fazla arttığı belirlenmiştir ( $p<.05$ ).  
**Sonuçlar:** Yoga nidra doğum sonrası bakım uygulamalarında ebe ve hemşireler tarafından güvenle kullanılabilir.

**Anahtar kelimeler:** mobilizasyon; postoperatif ağrı; sezaryen; yoga

### Introduction

Although pain experienced following cesarean section is an important symptom, postoperative pain is defined as acute pain that starts due to the surgical procedure, tissue damage at the surgical incision site, and gradually decreases with tissue healing. In addition, in the postpartum period, uterine contractions occur with the release of oxytocin to restore the uterus and this causes abdominal pain (Kintu et al., 2019; Visconti et al., 2020).

Pain experienced after cesarean section increases sympathetic nervous system activation, increases adrenaline, epinephrine, aldosterone, and cortisol levels, causes changes in metabolic activity, and delays recovery (Grabarz et al., 2021; Visconti et al., 2020). In addition, pain restricts mobility and causes a delay in mobilization, suppresses gastrointestinal functions by activating the sympathetic nervous system, and slows intestinal peristalsis, thus causing a delay in oral feeding (Verastegui-Martín et al., 2023; Visconti et al., 2020).

Postoperative pain also reduces patient comfort and satisfaction (Güney & Uçar, 2021). In the literature, it has been reported that mothers most frequently have problems with pain and mobilization after cesarean section and need help as a result of these problems affecting breastfeeding negatively (Cooklin et al., 2018; Ganer Herman et al., 2020). Pharmacological and nonpharmacological methods are frequently used to reduce postoperative pain (Veef & Velde, 2022; Zimpel et al., 2020). The fact that the pharmacological methods used have side effects on the mother and newborn and that these methods are inadequate has increased the tendency towards nonpharmacological methods. Many nonpharmacological methods (music, massage, reiki, relaxation exercises, reflexology, etc.) are used to reduce pain after cesarean section (Zimpel et al., 2020; Sabancı Baransel 2021). These methods are effective, inexpensive, practical, have no side effects, and can be easily applied by the nurse since they do not require a physician's order, in addition, they

significantly reduce the patient's need for analgesia and help the patient to relax (Güney & Uçar, 2021; Zimpel et al., 2020). Nonpharmacological methods affect the cognitive, affective, behavioral, and sociocultural dimensions of pain and lead the woman to perceive her pain at the lowest level by providing complete relaxation in the individual (Zimpel et al., 2020).

Yoga nidra means yoga sleep. Yoga nidra is one of the nonpharmacological methods that can be used to cope with postpartum problems. Yoga nidra is a powerful meditation, in the unconscious state associated with deep sleep the mind remains conscious (Pandi-Perumal et al., 2022). Relieves insomnia, promotes subjective well-being (Pandi-Perumal et al., 2022; Sharpe et al., 2023). In psychology, this is called a hypnogogic state, a state between sleep and wakefulness. (Ghibellini & Meier, 2023). Yoga nidra involves listening to audio readings. The practitioners lies comfortably on their back while the guide guides them through the meditation (Pandi-Perumal et al., 2022; Sharpe et al., 2023). Yoga nidra has six stages: internalization, Sankalpa (the most desired wish, intention, passion, and resolutions from the heart), consciousness rotation, breath awareness, opposite emotions, and externalization (Pandi-Perumal et al., 2022). When practiced regularly, it provides physical, mental, and intellectual health to the individual (Kumar & Aanand, 2016; Pal, 2022). When the mechanism of action is examined, it is stated that yoga nidra activates various brain regions (Ferreira-Vorkapic et al., 2018; Markil et al., 2012; Pal, 2022; Werner et al., 2015). Yoga nidra creates a response in the brain that is integrated by the hypothalamus, reducing sympathetic (excitation) nervous system activity and increasing parasympathetic (relaxation) nervous system function (Ferreira-Vorkapic et al., 2018; Markil et al., 2012; Werner et al., 2015). It is also stated that yoga nidra activates the parasympathetic nervous system in the body with high cardiac vagal control, which leads to a decrease in anxiety and an increase in sleep quality (Werner et al., 2015). In addition, thanks to the planned relaxation in the body, which is included in the stages of yoga nidra, and breathing exercises applied with conscious awareness, an increase in oxygenation in the body, acceleration in the excretion of metabolites, and acceleration in healing are provided (Ferreira-Vorkapic et al., 2018; Werner et al., 2015).

In research conducted, it has been reported that yoga nidra reduces subjective stress, anxiety, and depression in different clinical conditions, increases general well-being provided (Kim, 2017), reduces increased cortisol levels due to stress (Datta et al., 2021), improves perceived sleep quality (Wahbeh & Fry, 2019), provides normoregulation in vital signs, reduces the pain and fear level of the individual (Li et al., 2019), to be an effective reduction in blood pressure and inflammatory response (Devraj et al., 2021). However, there is no clinical study examining the effect of yoga nidra on pain, mobilization, first walking distance and satisfaction with care after cesarean section. The study planned in this direction aims to examine the effect of yoga nidra on pain, mobilization, first walking distance, and care satisfaction after cesarean section.

Hypotheses of the research:

H0. Yoga nidra has no effect on pain, mobilization, first walking distance, and care satisfaction after cesarean section.

H1. Yoga nidra reduces pain

H2. Yoga nidra increases mobilization

H3. Yoga nidra increases the first walking distance

H4. Yoga nidra increases care satisfaction.

## Methods

### Research design and participants

This is a randomized controlled trial. Therefore, this study was planned and reported according to the CONSORT 2022 guidelines (Sunay et al., 2013; Junqueira et al., 2023).

The researcher AK received an International Certificate of Pregnant Yoga before starting the research. The training content consists of theoretical and practical information. Yoga nidra practice was applied only by researcher AK.

This research was registered in the NIH U.S. National Library of Medicine Clinical Trial Registry (ClinicalTrials.gov registration number NCT06070844) on September 18, 2023.

Inclusion criteria; women who gave birth by cesarean section, had spinal anesthesia, were 19-35 years of age, at 37-42 weeks of gestation had a singleton birth, not having chronic diseases (diabetes mellitus, hypertension, etc.), not performed yoga nidra practice before were included in the study. Exclusion criteria; women who did not meet the inclusion criteria, not accept to participate in the study, wanted to leave the study after inclusion were excluded. There were no women who voluntarily left the study or had any problems with themselves or their babies. No adverse side effects or complications of Yoga Nidra were observed during the study.

### Setting and relevant context

This study was conducted in the Gynecological Surgery 1 and 2 Services of Şanlıurfa Training and Research Hospital in Şanlıurfa with a high fertility rate in Türkiye between October 01, 2023 - December 28, 2023. There are approximately 26000 births in this hospital each year. The hospital where the study was conducted has the title of both Mother-Friendly Hospital and Baby-Friendly Hospital. According to the Management Guidelines for Childbirth and Cesarean Section Action published by the Ministry of Health of the Republic of Türkiye, regardless of whether there is any adverse clinical condition, women who give birth vaginally are followed up in the hospital for at least 24 hours and women who give birth by cesarean section are followed up in the hospital for at least 48 hours, skin to skin contact and first breastfeeding are initiated within the first 15 minutes after vaginal delivery (Republic of Türkiye Ministry of Health, General Directorate of Maternal and Child Health and Family Planning [RTMH-GDMCHFP], 2010). When the clinical condition of the mother is stable after cesarean section, breastfeeding is initiated immediately within the first 15 minutes to the first 120 minutes after delivery. After cesarean delivery with spinal anesthesia, mobilization is started in the sixth postoperative hour if the clinical condition of the mother is stable. In addition, all mothers who give birth in the hospital are given practical breastfeeding training by the baby nurse, mothers are observed, and support and counseling services regarding breastfeeding are provided continuously.

### Sample

Population consisted of women who had cesarean section in Gynecological Surgery 1 and 2 Services between October 01, 2023 – December 28, 2023. In the calculation of the sample volume of the study, the mean score of two independent groups was determined using the G\*power 3.1.9.2 program. In the sample size calculation, the minimum sample size was determined as 128 (experiment=64, control=64) women with a medium effect size  $d=0.5$ , type I error  $\alpha = 0.05$ , 80% power (Cohen, 1992; Faul et al., 2007). The sample of the study consisted of 128 women (yoga nidra group 64, control group 64).

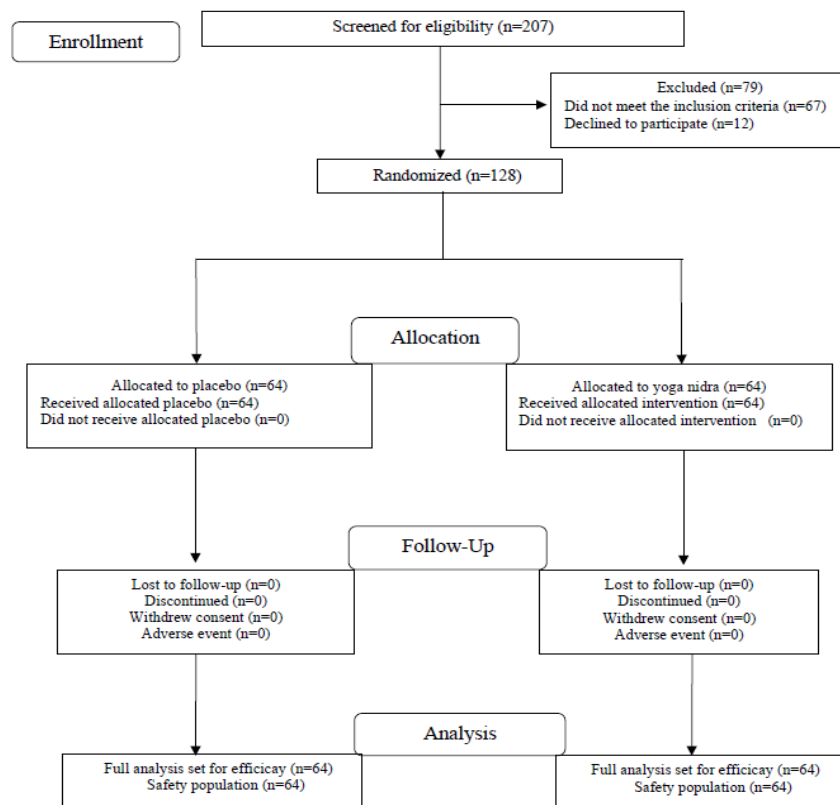


Figure 1. CONSORT 2022 Flow Diagram for the sample selection process for primiparous women separately

### Randomization, allocation concealment, and blinding

The sample was divided into yoga nidra and control groups by randomisation method. Firstly, there is one experimental group and one control group in the study. In order to determine which of these two groups was the experimental group and which was the control group, lots were drawn with a coin. When the coin was thrown into the air, the number 1 on the side that fell to the ground constituted the experimental group and the number 2 on the side that looked up constituted the control group. Then, using the Random Integer Generator on the random.org website in the randomisation method, a single column between 1 and 128 was created in which only the numbers 1 and 2 were included in these columns (the number range was determined as two). Considering the numbers 1 and 2 in the column, women were assigned to one of the numbers 1 and 2 in turn. Thus, 1: experimental group and 2: control group were formed. Therefore, 64 numbers one in the experimental group represented yoga nidra and 64 numbers two represented the control group.

One woman was interviewed in each patient room to avoid interaction between participants. The sample selection process of the study was carried out according to CONSORT criteria (Figure 1). Women in the experimental group were given 30 minutes of yoga nidra practice, while women in the control group were given 30 minutes of quiet rest in their rooms. Because it was thought that there might be an increase in the woman's interest in the real yoga nidra practice, silent rest, which is a placebo, was applied in parallel with yoga nidra. This was necessary to evaluate the placebo effect of yoga nidra practice. Therefore, since the women participating in the study did not know which of the experimental and control groups they were included in, but the researcher did, the study was planned as single blind. Statistical analyses were performed by researcher AK.

### Measurement

Introductory Information Form was used to determine sociodemographic characteristics of participants, Visual Analog Scale (VAS) was used to measure pain intensity, Patient Mobility Scale (PMS) required assessment by patient, and Observer Mobility Scale (OMS) required assessment by observer were used to assess mobilization, and Newcastle Satisfaction with Nursing Care Scale (NSNCS) was used to assess nursing care satisfaction. The woman's first walking distance after cesarean section was measured with a meter.

#### Introductory information form

This form, which was created by reviewing the literature, included a total of 13 questions, including 7 questions to determine the sociodemographic characteristics of women and 6 questions to determine obstetric characteristics.

#### Visual Analog Scale (VAS)

This is developed by Huskisson (1974) to assess pain severity, it consists of a 10-cm horizontal line labeled with "no pain" at the left end (0) and "worst pain possible" at the right end (10) (Huskisson, 1974). The individual is told to mark the point on this line that best expresses pain intensity. Scores range from a minimum of 0 to a maximum of 10, with higher scores indicating more severe pain (Eti Aslan, 2002).

#### Patient Mobility Scale (PMS) and Observer Mobility Scale (OMS)

It was developed by Heye et al. (2002). It consists of PMS and OMS. PMS was developed to measure patient perceptions of mobility after surgical intervention, and OMS was developed to measure objective observations of mobility. Four activities (turning, sitting, standing up, and walking) performed by patients after surgical intervention are evaluated (Heye et al., 2002). Turkish validity and reliability of the scale was carried out by Ayoğlu (2011).

### Patient Mobility Scale (PMS)

Measures the mobility perceptions of patients after surgical intervention. The level of pain and difficulty is assessed during four activities performed after surgical intervention (Ayoğlu, 2011; Heye et al., 2002). The difficulty of mobilisation is determined by measuring the distance between the mark placed by the patient on the scale and 0 with a ruler. There are four activities in the scale, and two subgroup questions are asked of the patients in each activity (Heye et al., 2002). The score for each item is between 0-15 and total score is between 0-120. The higher the score, the greater the difficulty in activity. Cronbach's alpha coefficient is 0.90 (Ayoğlu, 2011). In this study, 0.99 was found.

### Observer Mobility Scale (OMS)

The patient's dependence-independence status or degree of independence during the performance of four activities after surgical intervention is scored between 1 and 5. Calculated by summing the scores for turning, sitting, standing, and walking. Score for each items is between 1-5 and total score is between 4-20. The higher the score, the greater the difficulty in activity (Ayoğlu, 2011; Heye et al., 2002). Cronbach's alpha coefficient was 0.73 (Ayoğlu, 2011). In this study, 0.94 was found.

### Newcastle Satisfaction with Nursing Care Scale (NSNCS)

Scale was developed by Thomas et al. (1996) to assess nursing care satisfaction. Turkish validity and reliability were performed by Akin and Erdoğan (2007). Scale consists of two separate forms evaluating the patients' experiences (26 seven-point Likert-type items) and satisfaction (19 five-point Likert-type items) during nursing care (Akin & Erdoğan, 2007; Thomas et al., 1996). In this research, the satisfaction part was used. The satisfaction part is unidimensional. Peterson et al. (2005) reported that the scale is also a reliable tool in the evaluation of postpartum nursing care. Cronbach's alpha value of the scale is 0.96 (Akin & Erdoğan, 2007). In this study, 0.97 was found.

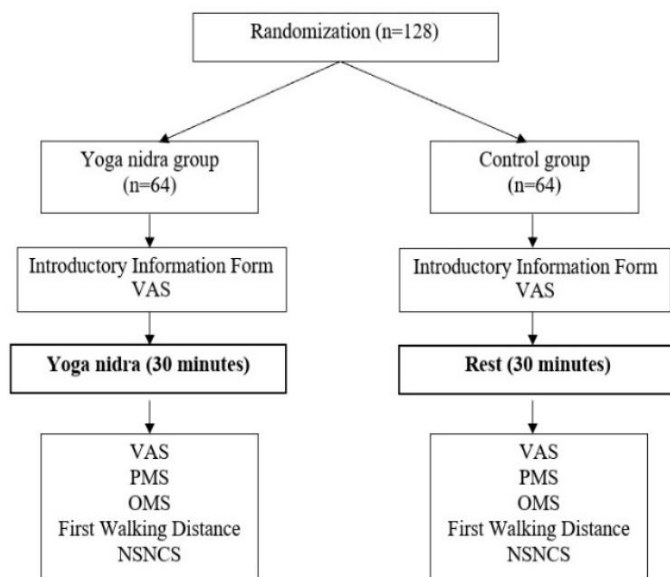


Figure 2. Application flow chart

VAS: Visual Analogue Scale; PMS: Patient Mobility Scale; OMS: Observer Mobility Scale; NSNCS: Newcastle Satisfaction with Nursing Care Scale; First Walking Distance: The distance in centimetres the woman walked from the moment she got out of bed until the moment she returned to bed.

### Data collection

Data were collected between October 01, 2023 – December 28, 2023. The administration of the questionnaires took an average of 10-15 minutes for each patient. Data were obtained by researcher AK by face-to-face interview technique in the sixth post-operative hour after cesarean section when the mother's condition was stable and the mobilization process was started. Information about the data collection and implementation flow chart is given in Figure 2.

### Intervention

In the study, routine postnatal care practices were applied to the women in yoga nidra and control groups in a standardized manner. Clinical status (vital signs, bleeding control, etc.) was assessed to determine whether women were stable throughout the postoperative period and at the sixth postoperative hour before the intervention. In addition, after the mobilization was completed, the women's clinical status (vital signs, bleeding control, etc.) was re-evaluated for stability. No complications or unfavorable conditions were detected in the clinical conditions of the women. The women in yoga nidra and control groups completed the Introductory Information Form and the VAS for pain at the sixth post-operative hour (the period when the mobilization process of the postoperative patient after cesarean section was determined by the Ministry of Health) (RTMH-GDMCHFP, 2010). After a cesarean section, participants in both yoga nidra and control groups were not given any analgesics before, during, or after the intervention.

### Yoga nidra (yoga sleep) group

Yoga nidra application steps were made within the framework of the Yoga Nidra Application Protocol. The Yoga Nidra (Yoga Sleep) Application Protocol is given in Table 1 (Li et al., 2019; Pandi-Perumal et al., 2022; Sharpe et al., 2023). Yoga nidra started at the sixth post-operative hour and applied once. Application time is approximately 30 minutes. Immediately after the application, the VAS was completed to re-evaluate the pain. Then, while the patient was gradually mobilized, the mobilization process was observed by researcher AK, and the OMS was completed by researcher AK. The woman's first walking distance was measured with a meter and recorded. After initial mobilization, the woman was allowed to rest in her bed. During this rest period, the woman was asked to complete the PMS and the NSNCS (Figure 2).

### Control group

Yoga nidra was not applied to women. The woman was asked to rest on her back in bed for 30 minutes. The data were collected by researcher AK at exactly the sixth postoperative hour by face-to-face interview method. All measurements were evaluated in parallel with those in the Yoga Nidra group (Figure 2).

### Data analysis

SPSS 26.0 package program was used to evaluate the data. It initially used descriptive statistics (frequency, percentage, mean±standard deviation). Pearson Chi-square analysis was used to analyze categorical variables according to yoga nidra and control groups, and an Independent Sample t-test was used to analyze numerical variables. Difference between pre and post-test mean scores was analyzed with Paired Sample t-test. In addition, effect size (d) levels are as follows; small level effect: .20, medium level effect: .50, and high level effect: .80 and above (Cohen, 1992; Faul et al., 2007). Statistical significance was accepted at  $p < .05$  and evaluated within a 95% confidence interval.

Table 1. Yoga nidra (yoga sleep) application protocol

**Yoga Nidra (Yoga Sleep) practice steps****Mental and physical relaxation, internalisation**

1. Pay attention to be still during yoga sleep
2. Eyes closed. Taking a deep breath and letting it out loud: haaaaa..... (3 repetitions)
3. Relaxation of the body through yoga sleep, focus on the feeling of relaxation

**Sankalpa/determination**

4. Repeating the sentence "I will stay awake during this practice" (3 repetitions) during this period when there is no intention to fall asleep normally
5. Warnings and commands given by the practitioner before starting the yoga practice;
  - Notice the body in stillness. From the top of the head to the soles of your feet, let the whole body be in your field of awareness. We will begin the practice of yoga sleep.
  - Repeat the phrase "I will do yoga sleep" inwardly. Now we will take awareness on a journey through the body. Allow awareness to move through the body as quickly as possible. I will name an area, you visualize that area of the body and at the same time feel that area. Stay awake but don't need to concentrate. You don't need to be serious or controlled. Relax and try to enjoy your body.

**Rotation of consciousness of different parts of the body**

6. Commands given by starting the yoga nidra practice from the right side of the body;
  - Notice your right hand. On the right hand, thumb, index finger, middle finger, ring finger and little finger. Right palm. Notice the top of the right hand. Right wrist. Right lower arm. Detect the elbow, right upper arm, right shoulder and right armpit. Right side of the waist, right hip. Right upper leg, right knee, right lower leg, right foot, right heel, right sole, top of the right foot, big toe, second toe, third toe, fourth toe, pinky toe of the right foot.
7. Commands given by starting the yoga nidra practice from the left side of the body;
  - Detect the thumb of the left hand. Index finger, middle finger, ring finger, little finger of the left hand. Feel the palm, top of the hand, left wrist, left lower arm, left elbow, left upper arm, left shoulder, left armpit. Left side of the lower back, left hip, left upper leg, left knee, left lower leg, left ankle, heel, foot sole, top of the left foot, left foot thumb, second finger, third finger, fourth finger, little toe of the left foot.
8. Commands given by starting the yoga nidra practice from the back of the body;
  - Perceive the right shoulder blade. On the upper back... Left shoulder blade, right hip, left hip, spine, back of the whole body. Now perceive the crown of the head. Top of the head, forehead, right eyebrow, left eyebrow, between the two eyebrows, right eyelid, left eyelid, right eye, left eye, right ear, left ear, right cheek, left cheek, nose, tip of the nose, upper lip, lower lip, chin, throat, right side of the rib cage, left side of the rib cage, middle of the rib cage, belly button, abdomen. The whole right leg, the whole left leg. Both legs. Both legs. Whole right arm, whole left arm. Both arms at once. Both arms at once. The whole back, shoulder blades, waist, hips, spine.
9. The commands given to practice yoga nidra starting from the front of the body;
  - Abdomen, rib cage. The front and back of the body at once.
  - The front and back of the body at once. Whole head, whole body. Whole body Whole body.
  - Don't fall asleep. Awareness... no sleeping. The whole body is lying down. The whole body is lying down. Perceive the whole body lying down. The whole body is lying in the room.
  - Notice your breath. Feel the breath ripple through the lungs. Keep the rhythm unchanged. Breathing is natural. You're not doing it. It flows by itself. Without effort. Keep your attention on the breath. Notice the movement of the rib cage. Notice movements synchronized with the breath. Your sternum is rising and falling. Your rib cage is expanding and contracting.

**Breath awareness**

10. Breathing commands
  - Now you count backwards from 18. Count it in your heart like this: "18 breasts rising, 18 breasts falling. 17 chest rising, 17 chest falling. 16 breasts rising, 16 breasts falling" keep going like this. Say the words and numbers in your head. ... Keep counting. If you have forgotten the number, start again at 18. Take your time. There is no goal... stop counting.
  - Invite awareness into throat. Watch your breath pass through the throat.... Start counting, focusing on the sensations the breath creates in this area: "18 breaths in through the throat, 18 breaths out through the throat. 17 breaths in through the throat, 17 breaths out through the throat. 16 breaths in through the throat, 16 breaths out through the throat..." continue. Say words and numbers from your heart.... Keep counting. If you have forgotten the number, start again at 18. Take your time. There is no goal... stop counting.
  - Call your awareness into your nostrils. Watch the breath pass through the nostrils. Follow how it feels. And start counting down from 18: "18 breaths in, 18 breaths out. 17 breaths in, 17 breaths out. 16 breaths in, 16 breaths out..." continue. Say the words and numbers in your head... Keep counting. If you have forgotten the number, start again at 18. Take your time. There is no goal... Stop counting. And release the breath...

**Contrasting emotions, imagery**

11. Continue with imagery (visualizing in the mind, feeling in the body, trying to feel in different emotional dimensions).
  - Burning candle. Burning candle (15 seconds)
  - Endless desert. Endless desert.
  - Torrential rain. Torrential rain.
  - Snowy mountains. Snowy mountains.
  - Minarets at sunrise. Minarets at sunrise.
  - Birds in the sky at sunset. Birds in the sky at sunset.
  - Pink clouds. Pink clouds.
  - Stars at night. Stars at night.
  - Full moon. Full moon.
  - Wind from the sea. Wind from the sea.
  - Waves lapping on the empty beach. Waves lapping on the empty beach.
  - The choppy sea. The choppy sea.
  - Waves lapping on the empty beach. Yanan mum. Yanan mum (15 seconds)

**Externalisation, return to normal**

12. Inviting the mind to the surface and noticing the breath
  - Feel the whole body. Your body is lying relaxed. You are breathing slowly and calmly. Feel the whole body from the top of the head to the feet. Feel the floor. Feel the objects around you, eyes still closed. Lie down for a while longer... Gradually give the body a movement. Start wiggling your fingers and toes. Stretch the arms, the legs. Take your time. When you feel that you are fully awake, get up slowly. Yoga sleep is over.

**Ethical approval**

Ethical approve was obtained from the Muş Alparslan University Scientific Research Ethics Committee (Board Decision No: 7/41) on July 7, 2023. Institutional approval was obtained from the Şanlıurfa Provincial Health Directorate (Registration no: E-49781372-774.99-224414068) on September 13, 2023. The purpose and content were explained in detail to the women included in the study and their written-verbal informed consents were obtained before application.

**Results**

**Sociodemographic, and obstetric characteristics of the participants**

Yoga nidra and control groups were similar in terms of sociodemographic (age, marital status, family type, education, working, income, social status) and obstetric characteristics (birth week, gravida, parity, living children, abortion, planned cesarean section, reason for cesarean section) ( $p > .05$ ) (Table 2).

**Effect of yoga nidra on pain, mobilization, first walking distance, and care satisfaction**

The pre-test VAS score averages for the pain of women in

yoga nidra ( $7.25 \pm .50$ ) and control groups ( $7.12 \pm .57$ ) were similar ( $p > .05$ ). The mean post-test VAS score for pain in the yoga nidra group ( $2.68 \pm .53$ ) was lower than the control group ( $6.10 \pm .66$ ) ( $p < .05$ ) (Table 3).

The mean PMS ( $60.79 \pm 6.92$ ), PMS turning ( $17.31 \pm 2.09$ ), PMS sitting ( $16.31 \pm 2.02$ ), PMS standing ( $14.57 \pm 2.15$ ), and PMS walking ( $12.59 \pm 1.69$ ) scores of the yoga nidra group were ( $99.89 \pm 6.88$ ,  $26.65 \pm 1.70$ ,  $25.89 \pm 1.72$ ,  $24.21 \pm 2.28$ ,  $23.12 \pm 2.49$ ) lower than the control group, respectively ( $p < .05$ ). The mean OMS ( $12.34 \pm .69$ ), OMS turning ( $3.28 \pm .45$ ), OMS sitting ( $3.04 \pm .37$ ), OMS standing ( $2.98 \pm .12$ ), and OMS walking ( $3.03 \pm .17$ ) scores of the yoga nidra group were ( $16.67 \pm 1.05$ ,  $4.37 \pm .48$ ,  $4.18 \pm .39$ ,  $4.06 \pm .24$ ,  $4.04 \pm .21$ ) lower than the control group, respectively ( $p < .05$ ) (Table 3).

First mean walking distance after cesarean section in the yoga nidra group ( $3633.28 \pm 620.99$  cm) was higher than in the control group ( $2787.18 \pm 667.25$  cm) ( $p < .05$ ). NSNCS mean score of the yoga nidra group ( $74.21 \pm 5.75$ ) was higher than the control group ( $51.79 \pm 4.85$ ) ( $p < .05$ ) (Table 3).

Table 2. Comparison of women in yoga nidra and control groups according to their sociodemographic and obstetric characteristics

Sociodemographic and obstetric characteristics	Yoga Nidra Group (n=64)	Control Group (n=64)	Test	p-Value
<b>Age, mean (SD)</b>	25.89 (3.86)	26.31 (4.52)	t= -.56	.572
<b>Marital status, n (%)</b>			a	
Married	64 (100)	64 (100)		
<b>Family type, n (%)</b>			b	.164
Nuclear	57 (89.1)	62 (96.9)		
Extended	7 (10.9)	2 (3.1)		
<b>Educational status, n (%)</b>			$\chi^2 = .56$	.756
Literate	36 (56.3)	33 (51.6)		
Primary school	20 (31.3)	24 (37.5)		
Middle school	8 (12.5)	7 (10.9)		
<b>Working status, n (%)</b>			a	
Not working	64 (100)	64 (100)		
<b>Income status, n (%)</b>			a	
Income lower than expenditure	64 (100)	64 (100)		
<b>Social security status, n (%)</b>			b	1.000
Yes	62 (96.9)	61 (95.3)		
No	2 (3.1)	3 (4.7)		
<b>Planned cesarean section, n (%)</b>			$\chi^2 = .15$	.694
Yes	17 (26.6)	19 (29.7)		
No	47 (73.4)	45 (70.3)		
<b>Birth week, mean (SD)</b>	39.04 (1.56)	39.07 (1.52)	t= -.11	.909
<b>Gravida, mean (SD)</b>	4.70 (1.91)	4.79 (1.90)	t= -.27	.782
<b>Parity, mean (SD)</b>	4.04 (1.52)	3.96 (1.64)	t= .27	.781
<b>Parity status, % (n)</b>			b	.744
Primiparous	4 (6.3)	6 (9.4)		
Multiparous	60 (93.8)	58 (90.6)		
<b>Living children, mean (SD)</b>	4.04 (1.52)	3.85 (1.58)	t= .68	.496
<b>Abortion, mean (SD)</b>	.65 (.76)	.84 (.96)	t= -1.22	.224
<b>Reason for cesarean section, n (%)</b>			$\chi^2 = 8.53$	.383
Breech presentation	6 (9.4)	8 (12.5)		
Postterm pregnancy	0 (0)	2 (3.1)		
Head-pelvis discrepancy	0 (0)	2 (3.1)		
Old CS	14 (21.9)	16 (25.0)		
Fetal distress	39 (60.9)	31 (48.4)		
Gestational hypertension	2 (3.1)	3 (4.7)		
Premature membranes rupture	1 (1.6)	1 (1.6)		
Placenta previa	0 (0)	1 (1.6)		
Macrosomia	2 (3.1)	0 (0)		

<sup>a</sup> No statistics are computed because variable is a constant; <sup>b</sup> Fisher's Exact Test was performed because the number in the eyes was less than 5; t: Independent Sample t Test;  $\chi^2$ : Pearson Chi-square Test; SD: Standard Deviation.

Table 3. Comparison of VAS for pain, PMS, OMS and NSNCS mean scores and average first walking distance after caesarean section of women in yoga nidra and control groups

Scale and subscales	Yoga Nidra Group (n=64) Mean (SD)	Control Group (n=64) Mean (SD)	Mean Difference [95% CI]	Test	p	d	Effect Size Level
<b>VAS</b>							
Pre test	7.25 (.50)	7.12 (.57)	.12 [-.06 , .31]	t=1.30	.194		
Post test	2.68 (.53)	6.10 (.66)	-3.42 [-3.63 , -3.21]	t=-32.04	<.001	5.71	High
Test, p	t=54.99 p<.001	t=14.80 p<.001					
<b>PMS</b>							
Turning from side to side in bed	60.79 (6.92)	99.89 (6.88)	-39.09 [-41.50 , -36.67]	t=-32.03	<.001	5.66	High
Sitting on the edge of the bed	17.31 (2.09)	26.65 (1.70)	-9.34 [-10.01 , -8.67]	t=-27.71	<.001	4.90	High
Standing up on the edge of the bed	16.31 (2.02)	25.89 (1.72)	-9.57 [-10.23 , -8.91]	t=-28.79	<.001	5.10	High
Walking in the patient room	14.57 (2.15)	24.21 (2.28)	-9.64 [-10.41 , -8.86]	t=-24.53	<.001	4.35	High
<b>OMS</b>							
Turning from side to side in bed	12.59 (1.69)	23.12 (2.49)	-10.53 [-11.27 , -9.78]	t=-27.95	<.001	4.94	High
Sitting on the edge of the bed	12.34 (.69)	16.67 (1.05)	-4.32 [-4.64 , -4.01]	t=-27.40	<.001	4.87	High
Standing up on the edge of the bed	3.28 (.45)	4.37 (.48)	-1.09 [-1.25 , -.92]	t=-13.14	<.001	2.34	High
Walking in the patient room	3.04 (.37)	4.18 (.39)	-1.14 [-1.27 , -1.00]	t=-16.78	<.001	2.99	High
First walking distance (cm)	2.98 (.12)	4.06 (.24)	-1.07 [-1.14 , -1.01]	t=-31.46	<.001	5.69	High
<b>NSNCS</b>							
First walking distance (cm)	3633.28 (620.99)	2787.18 (667.25)	845.78 [620.29 , 1071.26]	t=7.42	<.001	1.31	High
	74.21 (5.75)	51.79 (4.85)	22.42 [20.55 , 24.28]	t=23.81	<.001	4.21	High

SD: Standard deviation; 95% CI: %95 Confidence Interval; t: Independent Samples t-test; p: statistical significance level <.05; d: impact value (the effect size levels for the difference between the two means are as follows; small: 0.20, medium: 0.50 and high: 0.80 and above); VAS: Visual Analog Scale; PMS: Patient Mobility Scale; OMS: Observer Mobility Scale; NSNCS: Newcastle Satisfaction with Nursing Care Scale; cm: centimeter

## Discussion

In this study, which was conducted to determine the effect of yoga nidra on pain, mobilisation, first walking distance and satisfaction with care after caesarean section, it was determined that yoga sleep, which was one of the primary results of the study, decreased pain, increased mobilisation and satisfaction with care.

It was observed that the pain of the yoga nidra group decreased more than the control group. The effect of yoga nidra on pain was also found to be at a high level. This finding confirms our hypothesis H1. Although there are no studies in the literature examining the effect of yoga nidra on pain after cesarean section, there are studies supporting our findings in different patient groups section (Esencan & Rathfisch, 2023; Li et al., 2019). Li et al. (2019) reported that yoga nidra reduces pain in patients with colonoscopy, Esencan and Rathfisch (2023) reported that yoga nidra reduces pain during labour on women in labour. The nurse is expected to identify the problems experienced by women and take an active role in solving these problems (Uzunkaya-Öztoprak et al., 2023). Yoga nidra seems to be effective in relieving pain, which is one of these problems and seems to be an intervention that nurses can apply to the patient within the framework of their independent roles.

Early and planned mobilization practices applied after surgery support the normalization process of intestinal function by increasing gastrointestinal mobility and contribute to the prevention of complications related to gastrointestinal functions (Willner et al., 2023). When our study findings were examined, it was observed that the yoga nidra group obtained more positive results than the control group in the evaluation of PMS and OMS (turning, sitting, standing, and walking) and first walking distance, which included patient-centered and observer-centered measurements after yoga nidra application performed to normalize bowel functions, prevent complications and provide early ambulation. In addition, yoga nidra had a highly positive effect on the mobilization process. This finding confirms our hypothesis H2 and H3. Although there are no studies similar to this study, Ratarasarn and Kundu (2020) reported that yoga and Tai Chi provided clinically significant

improvements in 6-minute walking distance, forced expiratory volume in 1 second (FEV1), and health-related quality of life of individuals in patients with Chronic Obstructive Pulmonary Disease (COPD) and that both interventions were more effective than usual care in COPD. Ganer Herman et al. (2020) reported that early ambulation and appropriate pain control can improve the mobility of patients after cesarean section with appropriate staff and patient education. Esencan and Rathfisch (2023) reported that yoga and meditation reduced mothers' perception of pain and fear during the birth process and increased their self-efficacy. In addition, although the study did not directly evaluate the level of mobilization, it reported that it increased the self-efficacy of mothers describing their conscious effort in education (Esencan & Rathfisch, 2023). Yoga nidra activates several brain regions (Ferreira-Vorkapic et al., 2018; Markil et al., 2012), decreases sympathetic activity, and increases parasympathetic activity with high cardiac vagal control, resulting in increased physical subjective and objective sleep quality despite mental alertness, decreased anxiety and pain, and increased mobilization (Ferreira-Vorkapic et al., 2018; Markil et al., 2012; Werner et al., 2015). Since mobilization is a behavior that requires conscious awareness, it can be said that yoga nidra is therefore effective at this stage.

In this study, it was determined that the nursing care satisfaction of the yoga nidra group was higher than the control group and the effect of yoga nidra on nursing care satisfaction was at a high level. This finding confirms our hypothesis H4. Simsek Sahin and Can Gürkan (2023) reported that yoga causes neurophysiologic changes by affecting the release of  $\beta$ -endorphin and neurotransmitters, and provides relaxation by affecting the release of dopamine and serotonin, thus reducing symptoms such as stress and anxiety (Simsek Sahin & Can Gürkan, 2023). Ferreira-Vorkapic et al. (2018) reported that yoga nidra was effective in reducing stress and anxiety. In yoga nidra practice, thanks to imagery, planned relaxation, and aware breathing exercises, a decrease in pain level, an increase in oxygenation in the body, and acceleration in the excretion of metabolites accelerate healing, which is thought to positively affect care satisfaction (Ferreira-Vorkapic et al., 2018; Werner et al., 2015). This may have caused the



satisfaction of women in the yoga nidra group to increase more than those in the control group.

### Limitations and Strengths

This study has some limitations. Firstly, the study was conducted in a single centre, in a single period of time, in a single blinded fashion on women with similar sociodemographic and obstetric characteristics who gave birth by caesarean section for the first time. Secondly, the VAS for pain and the Patient-Centred Mobilisation Scale and Newcastle Satisfaction with Nursing Care Scale were self-reported by the women, but the Observer-Centred Mobilisation Scale for mobilisation of the woman was completed by the researcher AK. Therefore, there may be a detection bias in the study because it is based on the self-report of the individual. However, since the first walking distance of the woman was measured with a tape measure, we believe that the detection bias for mobilisation can be reduced in this study. In addition, women who had their first caesarean section were included in this study, but the fact that women were primiparous and/or multiparous can be seen as another influencing factor. However, we believe that we were able to reduce the importance of these factors with effective randomisation. Women in the yoga nidra group may have had an increased interest in yoga nidra practice independent of the yoga nidra intervention. To reduce this performance bias, the women in the control group were instructed to rest quietly in their beds for 30 minutes, similar to the women in the yoga nidra group, and the researcher AK was present to support the women, thus trying to reduce the performance bias in the study. In addition, with regard to the performance bias in the study, observer bias may be involved because the person who performed the intervention and the person who collected and evaluated the data were the same, the researcher knew who was in the intervention group and who was in the control group, and this was reflected in the evaluation of the effect. Finally, despite some limitations, one of the strengths of this study is that a randomised controlled design was followed. In addition, the use of valid scales and the inclusion of women who gave birth by caesarean section for the first time in the study are among the strengths of this study.

### Conclusion

Yoga nidra practice performed before the start of the mobilization process after cesarean section reduced postoperative pain, increased mobilization, and first walking distance, and increased women's satisfaction with nursing care. In addition, no side effects or complications of yoga nidra application were found in the study. Yoga nidra practice can be used safely among nursing care practices by nurses with National and International Yoga Certificates to contribute positively to pain management and mobilization process after cesarean section and to increase satisfaction with care. Thus, supporting the patient, which is one of the independent roles of nurses, will be provided and will contribute to the improvement of maternal health.

### Conflict of Interest

The authors have no conflicts of interest to disclose.

### Acknowledgements

The authors thank the mothers who participated in the study, Şanlıurfa Training and Research Hospital Gynecological Surgery 1 and 2 Services health professionals.

### Sources of Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

### Ethics Committee Approval

Ethics committee approval was obtained from Muş Alparslan University Scientific Research Ethics Committee (Board Decision No: 7/41) on July 7, 2023. Institutional approval was obtained from Şanlıurfa Provincial Health Directorate (Registration no: E E-49781372-774-99-224414068) on September 13, 2023.

Necessary ethical permissions were obtained from Clinical Trial for clinical studies (NCT06070844).

### Informed Consent

The purpose and content of the study were explained in detail to the women included in the study and their written and verbal informed consents were obtained before the application.

### Peer-Review

Externally peer-reviewed.

### Author Contributions

A.K.: Conceptualization, Data Collection and Curation, Formal Analysis, Funding Acquisition, Investigation, Methodology, Project Administration, Resources, Software, Supervision, Validation, Visualization, Writing-Original Draft, Writing-Review & Editing.

A.D.: Investigation, Resources, Validation, Writing-Original Draft, Writing-Review & Editing.

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