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# The Effect of Yoga on Foot/Leg Pain, Fatigue and Psychological Well-Being in Nurses: Randomized Controlled Study*

# Yoganın Hemşirelerde Ayak/Bacak Ağrısı, Yorgunluk ve Psikolojik İyi Oluş Üzerine Etkisi: Randomize Kontrollü Bir Çalışma

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## Abstract

**Aim:** This was a randomized controlled study to determine the effect of yoga on foot/leg pain, fatigue severity, and psychological well-being in nurses.

**Method:** The study was a randomized controlled trial. We conducted the study with 45 working nurses, 25 of whom were placed in the control group and 20 in the experimental group. An Individual Identification Form, the Visual Analog Scale, the Fatigue Severity Scale, and the Psychological Well-Being Scale were used to collect data. A total of 16 yoga sessions were held with the nurses in the experimental group, two days a week for eight weeks.

**Results:** A significant difference was found between the scores for the Visual Analog Scale and for the life goals subdimension of the Psychological Well-Being Scale in the experimental group in the pre-test and post-test ($p < 0.05$). There were time-dependent changes in terms of fatigue severity; the differences in the post-test mean scores (mean of 4.36) of the nurses in the control group were not statistically significant ($p > 0.05$).

**Conclusions:** Yoga is an effective method for reducing pain and creating a purpose in life. It has a positive effect on pain and psychological well-being. Nurses can thus practice yoga effectively for their own health.

**Keywords:** Nurse, yoga, pain, fatigue, psychological well-being.

## Öz

**Amaç:** Bu çalışma, yoganın hemşirelerde ayak/bacak ağrısı, yorgunluk şiddeti ve psikolojik iyi oluş hali üzerine etkisini belirlemek amacıyla yapılan randomize kontrollü bir çalışmadır.

**Yöntem:** Çalışma 25 kontrol grubu, 20 deney grubu olacak şekilde çalışan hemşireler ile gerçekleştirilmiştir. Deney grubundaki hemşirelere 8 hafta boyunca haftada iki gün olmak üzere toplam 16 seans yoga uygulaması yapılmıştır. Verilerin toplanmasında; 'Birey Tanılama Formu, Vizüel Analog Skala (VAS) Ağrı Skalası, Yorgunluk Şiddeti Ölçeği, Psikolojik İyi Olma Hali (PİO) Ölçeği' kullanılmıştır.

**Bulgular:** Deney grubundaki hemşirelerin VAS ağrı skala ve PİO ölçeği yaşam amaçları ölçek alt boyutu arasında ön test ve son testte anlamlı bir farklılık bulunmuştur ($p < 0.05$). Yorgunluk şiddeti açısından zamana bağlı değişiklikler belirlenirken, kontrol grubundaki hemşirelerin son test ortalama puanlarındaki (ortalama 4,36) farkları, istatistiksel olarak anlamlı bulunmamıştır ($p > 0,05$).

**Sonuç:** Yoga ağrının azaltılmasında ve yaşamdaki amacın oluşturulmasında etkili bir yöntem olup hemşireler için yoga uygulanabilir, güvenli ve ağrı, psikolojik iyi olma üzerinde olumlu bir etkiye sahip bulunmaktadır. Hemşireler tarafından yoga yöntemi etkili bir şekilde kullanabilir.

**Anahtar Sözcükler:** Hemşire, yoga, ağrı, yorgunluk, psikolojik iyi oluş.

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## Introduction

Yoga is a discipline and practice that improves people's health and sense of wellness, and is employed around the world today as a complementary alternative therapy (Cramer et al., 2013; Ponte et al., 2019). The popularity of yoga is steadily increasing, and its use has been accepted and integrated into today's society (Khalsa et al., 2016). Yoga is an *asana*- (yoga postures-) based practice that also involves meditation and *pranayama* (breathing techniques). Research has demonstrated that yoga positively affects both mental and physical health (Domingues, 2018; Khalsa et al., 2016).

Complementary therapies and practices, such as yoga, that focus simultaneously on the mind and the body can lead to improvements in individuals' quality of life (Cramer et al., 2013; Suleiman-Martos et al., 2020; Tarantino et al., 2013; Whitehead and Fogerite, 2017). Yoga can reduce the experience of pain and help patients recover their psychosocial functioning; for this reason, it has been broadly adopted as an alternative treatment (Hurst et al., 2018; Thomas et al., 2021; Cramer et al., 2016; Demirel et al., 2019).

Nurses are among the professionals who frequently experience musculoskeletal disorders and pain, which lead to feelings of tiredness and fatigue (Krishnan et al., 2021; Hosseini et al., 2022). Their long working hours and shift work can increase feelings of pain, and they can suffer from various kinds of fatigue (Sapulu and Neriman, 2021). When such experiences last for extended periods of time, this increases nurses' risk of burnout (Ersezgin and Sevi Tok, 2019). A further result is that individuals suffering from these symptoms may feel inadequate and exhausted (Si and Kılınç, 2022).

Yoga has been found to have a positive effect both in terms of managing stress and on psychological well-being in general (Ciezar-Andersen et al., 2021). Among its other benefits, it has been shown to help improve the mental health of its practitioners (Field, 2016). In people who are already generally healthy, yoga preserves their health and contributes to any healing that is required. As a practice, it can be engaged in by people of any age. It is also safe, non-invasive, and low-cost, and has been the focus of many evidence-based studies (Seki Öz, 2021).

Being a nurse can lead to stress, fatigue, and pain as a result of lengthy working hours, and there is a need for new studies on this topic. In this regard, the purpose of the present study was to determine the effect of yoga on foot/leg pain, fatigue, and psychological well-being in nurses.

**Hypotheses of the Study**
H0: Yoga has no effect on foot/leg pain, fatigue, and psychological well-being in nurses.
H1: Yoga has an effect on foot/leg pain, fatigue, and psychological well-being in nurses.

## Method

**Study Design:** This study was a randomized controlled trial with nurses who were employed in a state hospital between October 2022 and January 2023. It was conducted with nurses working in the emergency, cardiology, internal medicine, surgery, and obstetrics and gynecology units. Data collection and yoga sessions were carried out in a room in the obstetrics department of the hospital.

**Setting and Sample:** Fifty nurses who agreed to participate, did not have any diagnosed psychiatric disorders, and were not taking antidepressants were included in the study. Nurses who did not meet these inclusion criteria were excluded.

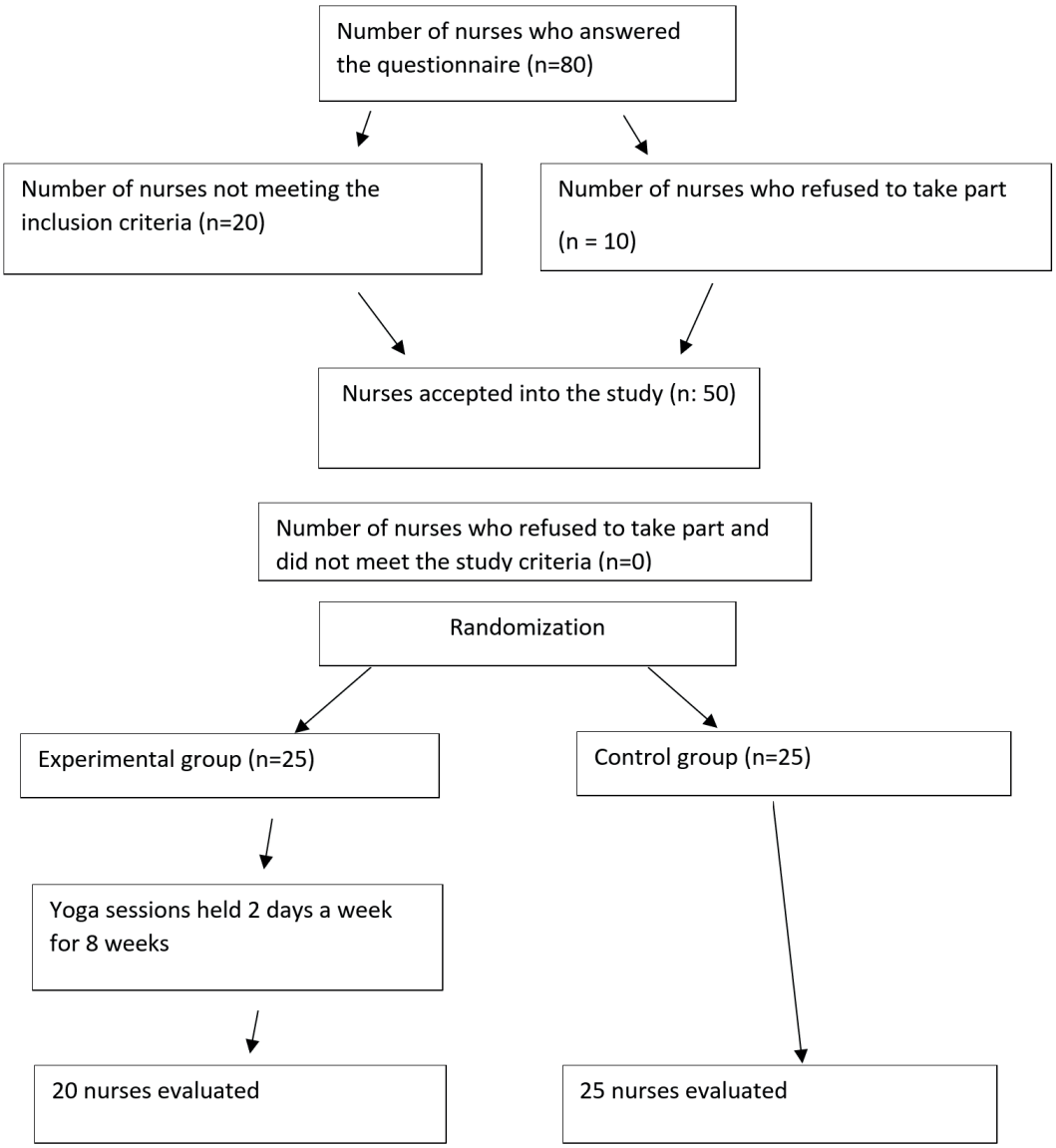


**Figure 1. CONSORT flow diagram**

The CONSORT Flow Diagram is shown in Figure 1.

At a power of 95% and a significance level of 5%, the sample size was calculated to be 50 participants. Five nurses from the experimental group did not want to continue the study. We thus completed the study with 45 nurses, 20 of whom were in the intervention group and 25 in the control group.

**Randomization:** The participants were randomly assigned to either the control group or the intervention group to minimize selection bias and ensure comparability between the groups. A computer-generated research randomizer was used to assign participants to each group, ensuring an unbiased allocation. Block randomization was applied to balance the number of participants in each group, preventing significant differences in sample size.

**Data Collection Instruments**
*Individual Identification Form:* This form contained 10 questions regarding the nurses' basic characteristics, including their gender and age.
*Visual Analog Scale (VAS):* This scale has the form of a 10-cm line printed on a page. Individuals are asked to indicate the severity of the pain they are experiencing by marking a point on the line: the left end of the line represents "No Pain," while the right end of the line represents "Unbearable Pain" (Ostelo et al., 2008).
*Fatigue Severity Scale (FSS):* This scale, which consists of nine items, was developed by Krupp and confirmed as valid and reliable in a Turkish setting by Gencay and Can (2012). In the validity and reliability study of the scale, Cronbach's alpha was found to be 0.85. In the present study, Cronbach's alpha was found to be 0.94.
*Psychological Well-Being Scale (PWS):* This scale was developed by Ryff et al. (1989), and the validity and reliability study of the Turkish version of the scale was conducted by Akın et al. (2012). The PWS consists of 42 items and six subdimensions: autonomy, environmental dominance, individual development, positive relationships, life goals, and self-acceptance (Akın et al., 2012). In the validity and reliability study of the scale, Cronbach's alpha was found to be 0.80. It was found to be 0.94 in the present study.

**Data Collection:** In the first stage of the study, nurses filled in the Individual Identification Form, the FSS, the PWS, and the VAS. A total of 80 individuals employed in internal medicine, surgery, gynecology, emergency, and palliative services completed the surveys. Forty-five individuals who met the inclusion criteria were contacted again and were included in the research sample.

**Intervention:** The yoga sessions took place twice a week for eight weeks, for a total of 16 sessions. After the first two weeks, the nurses could no longer take part in person, and the sessions were thus delivered online via Zoom. This development had not been foreseen when the study was planned, but the situation arose during the data collection process. The yoga sessions were held on Tuesdays and Thursdays between 20:00 and 21:00. For participants who could not attend, the classes were repeated on Wednesdays between 20:00 and 21:00. The control group did not take part in any yoga sessions during this period.

**Study Procedure:**
*Experimental Group (Yoga Intervention):* The participants in the experimental group participated in a structured yoga intervention program for a duration of eight weeks. The yoga sessions were conducted twice a week to ensure consistency and adherence to the intervention. Each session lasted approximately 35-40 minutes and consisted of a combination of breathing exercises (*pranayama*), yoga postures (*asanas*), and relaxation techniques (Figure 2).
Breathing Exercises (*Pranayama*):
*AUM Pranayama* (6 minutes): This breathing exercise involved the repetition of the "AUM" sound. It was intended to improve concentration and may also help calm the mind, as well as reduce feelings of stress.
*Nadi Shodhana* (Alternate Nostril Breathing) *Pranayama* (3 minutes): This was a controlled breathing exercise that enhances oxygenation and was intended to facilitate relaxation.
Yoga Postures (*Asanas*):
*Surya Namaskar* (Sun Salutation) (20 minutes): This exercise consisted of a series of 12 postures that aid flexibility, target various muscle groups, and improve circulation.
*Savasana* (10 minutes): The participants were asked to focus on their breathing while lying down in a comfortable and relaxed position.
*Implementation and Supervision:*
The yoga sessions were led by Meryem Erdoğan Acar, who had received yoga training and certification. The participants attended the yoga sessions regularly. The VAS, FSS, and PWS were re-administered to the intervention group at the end of the study.
*Control Group:* No yoga was taught to the control group; however, members of this group were given a yoga session at the end of the study if they requested it.

**Data Analysis:** The JASP program (JASP Team, University of Amsterdam, Version 0.16.1) was used to analyze the data. Numerical data were expressed as mean and standard deviation. Categorical data were expressed as numbers and percentages. Levene's test was used to determine whether the variances, which are the measure of variability/dispersion in the groups, were similar. ANOVA was employed to compare groups, and the level of significance was set at $p<0.05$.

**Ethical Principles:** Approval to conduct the study was granted by the Human Research Ethics Committee of Sinop University (06.07.2022/129). The participants filled in a written consent form before the study, and the principles of the Declaration of Helsinki were adhered to. Written permission to use the scales in the study was obtained from their original developers.

## Results

Descriptive statistics are shown in Table 1.

**Table 1. Demographic characteristics of nurses in the experimental and control groups**

| | | Control | | Experimental | |
|---|---|---|---|---|---|
| | | n | Column n % | n | Column n % |
| Marital status | Married | 8 | 32.0% | 14 | 70.0% |
| | Single | 17 | 68.0% | 6 | 30.0% |
| Education status | Health Vocational High School | 6 | 24.0% | 0 | 0.0% |
| | Associate Degree | 4 | 16.0% | 4 | 20.0% |
| | Bachelor's Degree | 14 | 56.0% | 14 | 70.0% |
| | Graduate Degree | 1 | 4.0% | 2 | 10.0% |
| The unit you are working in | Internal Medicine Unit | 0 | 0.0% | 11 | 55.0% |
| | Surgical Unit | 5 | 20.0% | 2 | 10.0% |
| | Other | 20 | 80.0% | 7 | 35.0% |
| Professional role | Midwife | 4 | 16.0% | 2 | 10.0% |
| | Nurse | 18 | 72.0% | 17 | 85.0% |
| | Others | 3 | 12.0% | 1 | 5.0% |
| Working hours | 08.00-16.00 | 1 | 4.0% | 10 | 50.0% |
| | 16.00-08.00 | 0 | 0.0% | 0 | 0.0% |
| | 08.00-16.00/18.00-08.00 | 0 | 0.0% | 5 | 25.0% |
| | 08.00-08.00 | 24 | 96.0% | 5 | 25.0% |
| Chronic disease | Yes | 4 | 16.0% | 3 | 15.0% |
| | No | 21 | 84.0% | 17 | 85.0% |
| Foot/leg pain | Yes | 21 | 84.0% | 20 | 100% |
| | No | 4 | 16.0% | 0 | 0% |
| Age, mean (standard deviation) | | 29.32 (6.59) | | 36.6 (9.39) | |
| Years of employment in the institution, mean (standard deviation) | | 5.28 (6.18) | | 12.55 (10.25) | |

*Categorical data are summarized with numbers and percentages, and numerical data are summarized with mean and standard deviation.

The average age of the participants was 29.32 (SD=6.59). The PWS life goals and pain subdimension scores changed in the post-test measurements for the experimental and control groups *(p<0.001 and p<0.05*). The pain scores changed after the intervention. Positive changes were observed over time in the PWS, FSS, and autonomy subdimensions in the intervention group during and after the implementation, underscoring the intervention's positive effect. The pain scores decreased from an average of 6.5 (SD=2.07) to 3.45 (SD=2.37), while the control scores decreased from 4.6 (SD=2.69) to 4.36 (SD=2.71). In life goals, there was an increase from 33.05 (SD=5.06) to 34.55 (SD=5.54) in the intervention group, while there was a decrease in the control group from 33.8 (SD=6.06) to 32.64 (SD=6.44). There were only time-dependent changes in autonomy and FSS. With regard to FSS and autonomy, only time-dependent changes were observed (Table 2).

**Table 2. Comparison of the VAS, FSS, and PWS pretest and posttest total score averages of the nurses in the experimental and control groups**

| | Experimental | | Control | | Time*Group | Time | Group |
|---|---|---|---|---|---|---|---|
| | Before | Later | Before | Later | F (p) | F (p) | F (p) |
| VAS score | 6.5 (2.07) | 3.45 (2.37) | 4.6 (2.69) | 4.36 (2.71) | **22.52 (< .001)** | 30.87 (< .001) | 0.52 (0.477) |
| FSS | 5.16 (1.52) | 4.67 (1.54) | 4.91 (1.19) | 4.65 (1.16) | 1.16 (0.288) | **11.16 (0.002)** | 0.12 (0.731) |
| Autonomy | 31.25 (5.06) | 29.6 (5.4) | 33.2 (5.49) | 32.6 (5.06) | 1.96 (0.169) | **9.01 (0.004)** | 2.61 (0.113) |
| Enviromental Mastery | 32.45 (4.87) | 32.45 (5.18) | 34.68 (6.37) | 33.92 (6.73) | 0.46 (0.503) | 0.46 (0.503) | 1.2 (0.279) |
| Personal Growth | 34.65 (5.29) | 33.85 (4.8) | 35.56 (5.67) | 35.16 (5.46) | 0.12 (0.727) | 1.11 (0.298) | 0.55 (0.463) |
| Positive Relations | 36.05 (8.23) | 36.35 (7.71) | 36.28 (6.68) | 35.48 (5.75) | 0.41 (0.527) | 0.08 (0.774) | 0.03 (0.869) |
| Purpose in Life | 33.05 (5.06) | 34.55 (5.54) | 33.8 (6.06) | 32.64 (6.44) | **5.54 (0.023)** | 0.09 (0.765) | 0.12 (0.729) |
| Self-Acceptance | 32.1 (7.92) | 34.45 (7.92) | 32.88 (6.63) | 32.64 (5.5) | 3.37 (0.073) | 2.24 (0.142) | 0.07 (0.794) |
| Pyschological Well-Being | 199.55 (28.77) | 201.25 (30.65) | 206.4 (31.4) | 202.44 (28.4) | 1.26 (0.267) | 0.2 (0.656) | 0.22 (0.642) |

*For numerical variables, group comparisons were made using mixed-design (split-plot) analysis of variance (ANOVA) in repeated measures.

The changes and yoga movements of the control and intervention groups are shown in Figures 2-3.

**Figure 2. Suryanamankar (This figure was created by the author mentioned in the article, Meryem Erdoğan Acar).**

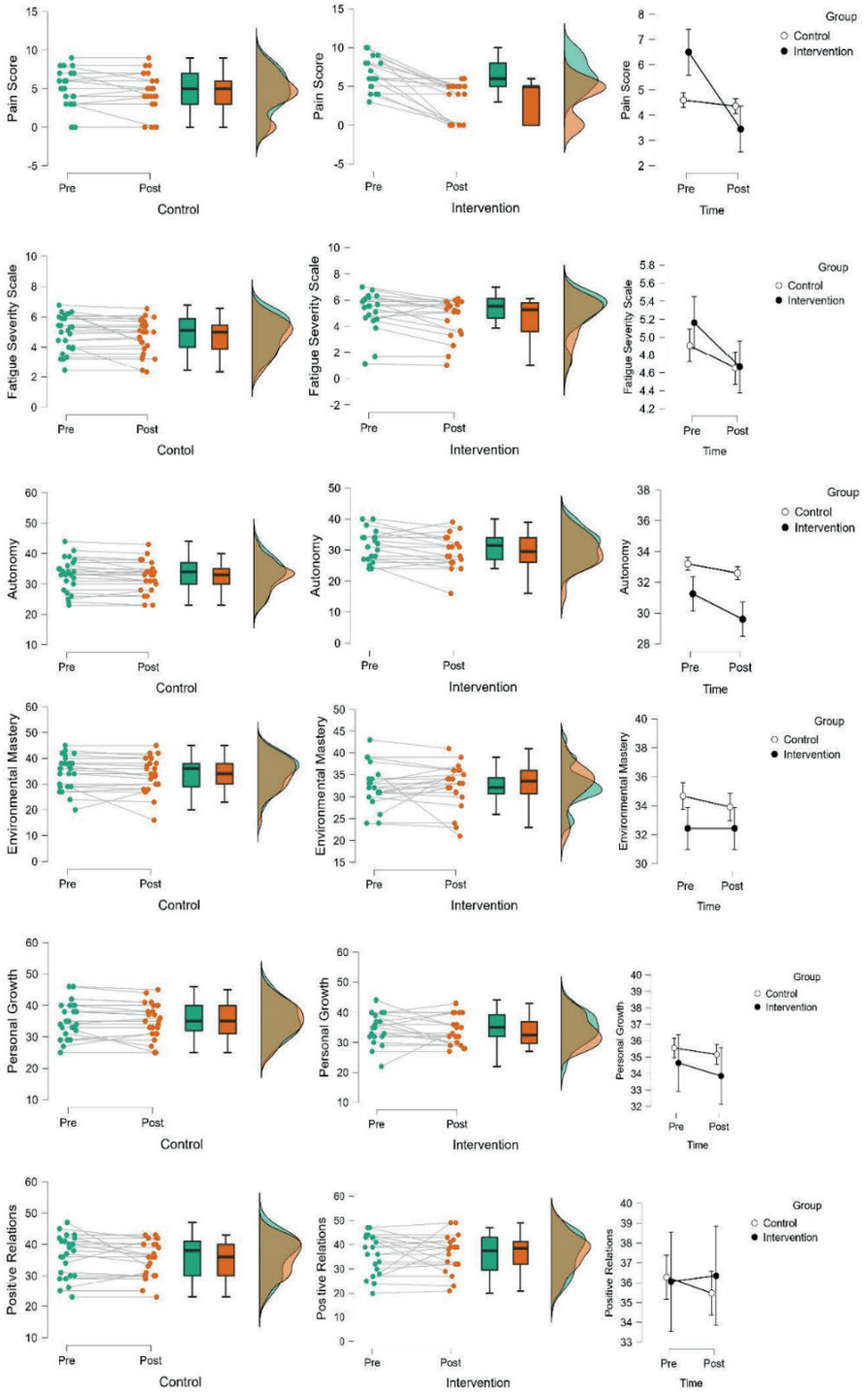


**Figure 3. Experimental and control group scale score changes and comparisons**

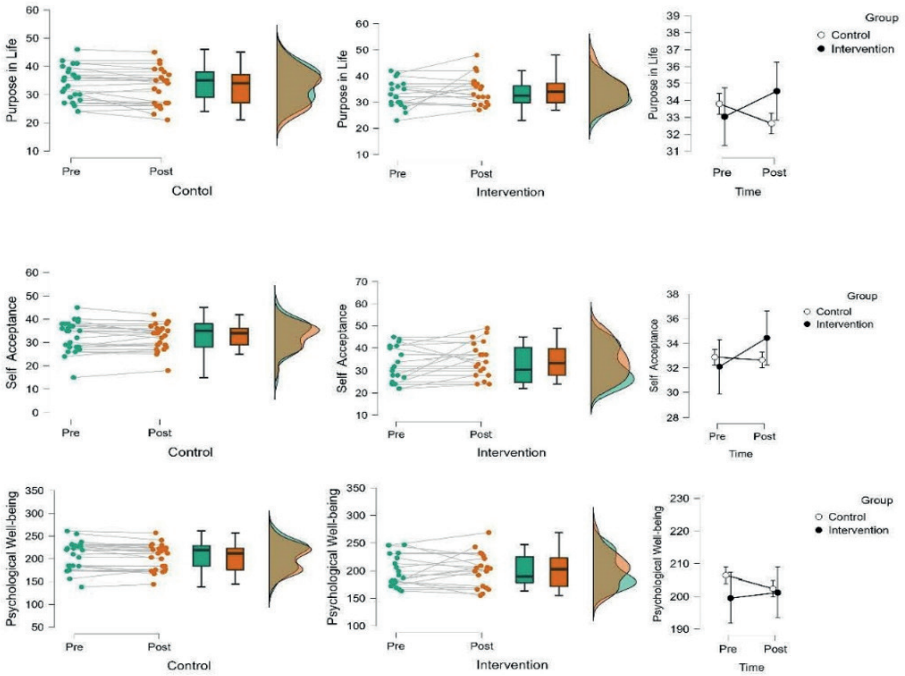


**Figure 3. Continued**

In terms of FSS and Autonomy, there were only time-dependent changes. There was a similar decrease in both groups over time. In other words, the intervention did not have a statistically significant effect. For the other measurements, neither the intervention nor time had any effect.

## Discussion

In the present study, the participants in the yoga group exhibited a significant reduction in pain levels and an increase in the life goals subdimension of the PWS, along with a time-dependent decrease in fatigue severity compared to the control group (Table 2). *Pranayama*, a specific breathing control technique, contributed significantly to these outcomes. Regular practice of *pranayama* is known to promote both psychological and physical relaxation (Kulkarni et al., 2022). These effects can be largely attributed to the regulation of the autonomic nervous system through conscious breath control and mental focus (Demirel et al., 2019).

The breathing and relaxation techniques used in yoga seem to reduce muscular tension and pain, and combat feelings of stress (Demirel et al., 2019; Singphow et al., 2022). The literature thus supports the findings of the present study.

In one follow-up study, just seven days of yoga was found to be superior to traditional physiotherapy in improving outcomes related to anxiety, depression, and pain (Singphow et al., 2022). These results support those of the present study and indicate yoga's potential not only as a strategy for pain management but also as a functional approach that enables individuals to remain active and autonomous in their daily lives, particularly in high-demand professions like nursing.

In the present study, the nurses' levels of fatigue changed over time. This was probably due to the fact that the yoga sessions took place in the evenings (Table 2, Figure 3). One study found that there was a positive correlation between how long nurses had to stand for and increased levels of fatigue (Gök and Koçbilek, 2022). These findings support those of the present study.

The yoga sessions carried out in the present study positively impacted the nurses' ability to find meaning in their lives and their mental well-being (Table 2). Yoga is a discipline that promotes personal development, reduces stress, and helps those who practice it to concentrate on their inner thoughts and feelings (Ponte et al., 2019). One study determined that yoga can effectively reduce feelings of sadness, anxiety, and anger (Hendriks et al., 2017). These findings show yoga's positive influence on emotional well-being, as also demonstrated in the present study.

Practicing yoga and meditation has been found to contribute to better psychological well-being and to improve cognitive and emotional functions (Kulkarni et al., 2022). The kinds of postures and breathing techniques employed in yoga significantly affect mental health and emotional regulation (Hendriks et al., 2017). Meditation and yoga have been determined to reduce perceptions of stress and strengthen nurses' ability to cope with their jobs (Deible et al., 2015). The positive impact of yoga on mental health, particularly in reducing depression and anxiety, has been known for some time (Priyanka and Rasania, 2021). These findings support those of the present study and demonstrate that yoga improves mental health and reduces stress. Yoga is a non-invasive, non-pharmacological discipline that has positive physiological and psychological effects on health and social functioning (Si and Kılınç, 2022).

**Implications for Nursing Research and Practice:** The present study suggests that nurses may benefit from yoga as a method to manage work-related stress and pain, and improve personal well-being. Stress-management techniques, including yoga, could form part of nurses' professional development, helping them cope with the emotional challenges of their role. The study highlights the potential of yoga as a non-pharmacological, holistic intervention that can be integrated into workplace wellness programs for nurses. Given the high prevalence of burnout, musculoskeletal pain, and fatigue among nurses, incorporating yoga-based interventions may not only improve individual well-being but also enhance job performance and the quality of patient care. Future nursing research should explore the long-term effects of such interventions and evaluate their cost-effectiveness and feasibility in different clinical settings.

**Strengths and Limitations:** Among the limitations of the study is the fact that, after the first two weeks, the yoga classes were delivered online via Zoom because the nurses were no longer able to actively participate in person. This development had not been anticipated when the study was planned, but it occurred during data collection. The fact that this study is one of only a few to measure the effect of yoga on nurses' foot/leg pain and fatigue, and that it took the form of a randomized controlled study, constitute the strengths of the research.

## Conclusions

The study demonstrated that practicing yoga regularly reduced pain in the intervention group compared to the control group and affected levels of psychological well-being and fatigue over time. Taking part in regular yoga sessions can reduce nurses' pain and fatigue, strengthen their physical and mental resilience, and positively affect their psychological well-being. The fact that yoga has many other benefits makes it a highly attractive technique for those seeking to improve their overall health.

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**Author Contribution:** The authors confirm contribution to the paper as follows; study conception and design: YÖG, MEA; data collection: YÖG, MEA; analysis and interpretation of results: YÖG, MEA; draft manuscript preparation: YÖG, MEA; All authors reviewed the results and approved the final version of the manuscript.
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