Turkish Journal of Clinics and Laboratory

To cite this article: Ozdemir BG, Dolas R, Sarihan ND, Koken FZ, Bilgi A, Celik C. Effect of nutritional support on sleep quality in patients diagnosed with gynecological malignancy. Turk J Clin Lab 2026; 1: 1861765.

Research Article

Effect of nutritional support on sleep quality in patients diagnosed with gynecological malignancy

Jinekolojik malignite tanılı hastalarda beslenme desteğinin uyku kalitesi üzerine etkisi

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Abstract

Aim: Among the severe medical conditions that have a detrimental effect on patients' general quality of life are gynecological cancers. These patients may experience issues, including sleep difficulties and dietary inadequacies, as a result of the disease itself as well as the treatment procedure. In this regard, it is essential to investigate how enteral formula supplementation affects the sleep quality of these patients to establish comprehensive care strategies that optimize their overall well-being. This study aimed to evaluate the effect of enteral nutrition support on sleep quality in patients diagnosed with gynecological malignancies and to offer new perspectives on holistic approaches to cancer care.

Material and Methods: A prospective study was designed between 2023 and 2025 in the Department of Obstetrics and Gynecology at Selçuk University Faculty of Medicine. Two groups were formed: one with and one without formula supplementation. Patients were evaluated using the Pittsburgh Sleep Quality Index (PSQI).The period during which they received formula was taken into account. The groups were evaluated primarily in terms of demographics, diagnosis, and surgical method.

Results: In the group receiving enteral nutrition support, the mean preoperative PSQI score decreased from 7.10 ± 3.99 to 5.52 ± 4.33 on the 14th postoperative day, showing a significant improvement in sleep quality ($p < 0.05$). In the group not receiving enteral nutrition support, although the preoperative PSQI score decreased from 8.10 ± 4.22 to 6.45 ± 3.80 in the postoperative period, this change was not statistically significant ($p > 0.05$). In the intergroup comparison, postoperative PSQI scores were found to be lower in the group receiving enteral nutrition, but the difference did not reach the level of statistical significance ($p > 0.05$).

Conclusion: The importance of sleep in evaluating the living standards of patients with malignant diseases is evident; therefore, individual support that increases sleep quality is considered to be of great importance.

Keywords: gynecologic oncology, sleep disorder, nutrition support

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Orcid No: 0000-0002-7025-4087
Doi: 10.18663/tjcl.1861765
Received: 12.01.2026 accepted: 22.02.2026 Publication date:

28.03.20261861765

Öz

Amaç: Jinekolojik kanserler, hastaların genel yaşam kalitesi üzerinde zararlı etkileri olan ciddi tıbbi durumlar arasındadır. Bu hastalar, hastalığın kendisinin yanı sıra tedavi sürecinin bir sonucu olarak uyku güçlükleri ve beslenme yetersizlikleri gibi sorunlar yaşayabilirler. Bu bağlamda, genel refahı optimize eden kapsamlı bakım stratejileri oluşturmak için enteral formül desteğinin bu hastaların uyku kalitesini nasıl etkilediğini araştırmak esastır. Bu çalışma, jinekolojik malignite tanılı hastalarda enteral beslenme desteğinin uyku kalitesi üzerindeki etkisini değerlendirmeyi ve kanser bakımına yönelik bütüncül yaklaşımlara yeni perspektifler sunmayı amaçlamıştır.

Gereç ve Yöntemler: Selçuk Üniversitesi Tıp Fakültesi Kadın Hastalıkları ve Doğum Anabilim Dalı'nda 2023-2025 yılları arasında prospektif bir çalışma tasarlandı. Biri formül desteği alan, diğeri almayan iki grup oluşturuldu. Hastalar Pittsburgh Uyku Kalitesi İndeksi (PSQI) kullanılarak değerlendirildi. Formül aldıkları süre dikkate alındı. Gruplar öncelikle demografik özellikler, tanı ve cerrahi yöntem açısından değerlendirildi.

Bulgular: Enteral beslenme desteği alan grupta, ortalama preoperatif PSQI skoru 7,10 ± 3,99 iken postoperatif 14. günde 5,52 ± 4,33'e gerileyerek uyku kalitesinde anlamlı bir iyileşme göstermiştir ($p < 0,05$). Enteral beslenme desteği almayan grupta ise preoperatif PSQI skoru postoperatif dönemde 8,10 ± 4,22'den 6,45 ± 3,80'e gerilemiş olsa da bu değişim istatistiksel olarak anlamlı bulunmamıştır ($p > 0,05$). Gruplar arası karşılaştırmada, postoperatif PSQI skorları enteral beslenme alan grupta daha düşük bulunmuş ancak fark istatistiksel anlamlılık düzeyine ulaşmamıştır ($p > 0,05$).

Sonuç: Malign hastalığı olan hastaların yaşam standartlarını değerlendirmede uykunun önemi aşikardır, bu nedenle uyku kalitesini artıran bireysel desteklerin büyük önem taşıdığı düşünülmektedir.

Anahtar Kelimeler: jinekolojik onkoloji, uyku bozukluğu, beslenme desteği

Introduction

Gynecological malignancies are among the most common cancers affecting women worldwide and pose a significant health burden due to their physical, psychological, and social consequences. During the treatment process, patients face multiple problems, including malnutrition, sleep disturbances, and a decreased quality of life. Malnutrition in cancer patients, resulting from tumor-related metabolic changes, treatment-related side effects, and reduced nutritional intake, impairs immune function, delays healing, and worsens prognosis [1]. Sleep quality is another critical determinant of overall health and is frequently impaired in oncology patients. Insomnia, interrupted sleep, and daytime dysfunction are commonly reported in this patient group [2]. Poor sleep not only exacerbates fatigue and psychological distress but can also negatively impact treatment adherence and outcomes [3].

Nutritional interventions, particularly enteral nutrition, are recommended as supportive strategies to enhance both physiological and psychological well-being in patients with cancer. Adequate nutrition is believed to contribute to improved sleep quality by balancing metabolic processes, enhancing energy levels, and mitigating treatment-related side effects [4]. However, evidence regarding the relationship between nutritional support and sleep quality in gynecologic oncology is limited.

This study aimed to evaluate the effect of enteral nutrition support on sleep quality in patients diagnosed with gynecological malignancies and to offer new perspectives on holistic approaches to cancer care.

Material And Methods

Patients who underwent surgery for gynecological malignancies between 2023 and 2025 at the Department of Obstetrics and Gynecology, Selçuk University Faculty of Medicine, were evaluated. Nutritional support (NS) is routinely provided in oncology cases in this department. Nestlé Oral Impact (Nestlé Health Science, headquartered in Vevey, Switzerland) nutritional solution is administered as an oral solution, 200 ml, three times daily. A minimum of 2 weeks of formula use is preferred. It is a medical nutrition product developed by Nestlé Health Science for immunonutritional purposes. It contains L-arginine, omega-3 fatty acids (EPA/DHA), and nucleotides. In addition to these three essential immune nutrients, it also contains high levels of protein (especially whey protein), carbohydrates, vegetable oils, soluble fiber, and vitamins and minerals (calcium, phosphorus, sodium, and zinc). Demographic data included age, gravidity, comorbidities (as goiter, diabetes mellitus, and hypertension), previous surgery, indication, smoking status, type of surgery.

Data were analyzed. Patients were questioned using the Pittsburgh Sleep Quality Index (PSQI), a validated 19-item self-report instrument that evaluates sleep patterns over a one-month period. The index encompasses seven distinct components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. Each component is weighted on a scale of 0 to 3, yielding a global PSQI score ranging from 0 to 21. According to established clinical thresholds, a total global score of 5 or greater indicates "poor sleep quality" and serves as a reliable marker for clinically significant sleep disturbances [5].

A total of 58 patients were included in the study. Patients were divided into two groups: those receiving enteral formula support (Group 1) and those not receiving enteral formula support (Group 2). Group 1 consisted of 31 patients (53.4%), and Group 2 consisted of 27 patients (46.6%). All patients completed the Pittsburgh Sleep Quality Index questionnaire 14 days after the baseline assessment. The results from the day before the operation were evaluated. Sleep quality was assessed through intergroup and intragroup comparisons at the end of the 14-day follow-up period and in the preoperative period.

Patients aged 18 years and older with a histopathological diagnosis of stage I endometrial cancer and who had undergone hysterectomy were included in the study. All participants were required to have completed Pittsburgh Sleep Quality Index (PSQI) assessments before surgery and on day 14 post-surgery, to have the cognitive ability to understand and answer the questionnaire, and to provide written informed consent. Patients with stage II-IV gynecological malignancies, known psychiatric disorders, use of antidepressants or antipsychotic medications, diagnosed primary sleep disorders, chronic use of sedative-hypnotic medications, need for intensive care due to serious postoperative complications, receiving parenteral nutrition, inability to complete the PSQI questionnaire, or incomplete clinical or follow-up data were excluded from the study.

The study was approved by the local ethics committee of Selcuk University (Ethic Approval Number: E-70632468-050.01-1141362) and conducted in line with the ethical principles of the Declaration of Helsinki. All patients were informed of the study objectives and provided written informed consent.

Statistical Analysis

Participant data were analyzed using descriptive statistics. Normality was assessed with the Kolmogorov–Smirnov and Shapiro–Wilk tests, which indicated non-normal distribution of preoperative and postoperative sleep scores. Therefore, the Wilcoxon Signed Rank Test was used to compare dependent measurements, revealing a statistically significant difference between preoperative and postoperative scores ($Z = -4.03$, $p < 0.001$). Effect size was calculated using Hedges' g due to the small sample size ($g = 0.75$), indicating a medium-to-large effect.

Results

A total of 58 patients were included in the final analysis. Of these patients, 31 (53.4%) were allocated to Group 1, receiving enteral formula supplementation, and 27 (46.6%) were allocated to Group 2, not receiving nutritional support. The ages of the participants ranged from 24 to 89 years, with a mean age of 56.97 ± 12.08 years. The most common number of pregnancies was three (24.6%), followed by two (21.1%) and five (19.3%). The majority of patients (83.3%) had at least one chronic disease; 43.3% had more than one chronic condition, while 40.0% had a single chronic disease. All patients were diagnosed with stage I endometrial cancer. Most participants underwent radical surgery (93.1%), whereas simple gynecological surgery was uncommon (5.2%) and 20.7% of the patients were smokers (Table 1). No significant differences were observed between groups in the distribution of demographic data.

Table 1. Demographic and Clinical Characteristics of the Study Population (Total).

Variable	Total (n=58)
Age (years), mean ± SD	**56.97 ± 12.08**
Presence of comorbidities, n (%)	**48 (83.3%)**
Smoking status, n (%)	**12 (20.7%)**
Diagnosis	**Stage I endometrial cancer (100%)**
Surgical procedure	**Hysterectomy (100%)**

In Group 1 (patients receiving enteral nutrition support), the mean preoperative PSQI score was 7.10 ± 3.99, while on the 14th postoperative day this value was found to be 5.52 ± 4.33. Comparing preoperative and postoperative PSQI scores in Group 1, a statistically significant improvement in sleep quality was observed in the postoperative period ($p < 0.05$). In Group 2 (patients not receiving enteral nutrition support), the mean preoperative PSQI score was 8.10 ± 4.22, and on the 14th postoperative day it was 6.45 ± 3.80. Although a decrease in PSQI scores was observed in Group 2 in the postoperative period, this change was not statistically significant ($p > 0.05$). In the intergroup comparison, it was found that the postoperative day 14 PSQI scores were lower in Group 1 than in Group 2 (5.52 ± 4.33 vs. 6.45 ± 3.80); however, this difference did not reach the limit of statistical significance ($p > 0.05$) (Table 2).

Table 2. Preoperative and Postoperative PSQI Scores by Groups.

Group	Preoperative PSQI (Mean ± SD)	Postoperative PSQI (Mean ± SD)	Intragroup p value
Group 1 (Enteral nutrition)	7.10 ± 3.99	5.52 ± 4.33	<0.05
Group 2 (No nutritional support)	8.10 ± 4.22	6.45 ± 3.80	>0.05
Total (n=58)	**7.57 ± 4.11**	**5.97 ± 4.07**	–

PSQI: Pittsburgh Sleep Quality Index.

Intragroup comparisons were performed using the Wilcoxon Signed Rank Test, and intergroup comparisons were performed using the Mann–Whitney U test. Postoperative Group 1 vs Group 2 p>0.05

Discussion

In this study, a significant improvement in sleep quality was observed in stage I endometrial cancer patients receiving enteral nutrition support in the postoperative period, while the decrease in PSQI scores observed in the group not receiving nutritional support was not statistically significant. In the intergroup comparison, although postoperative PSQI scores were lower in patients receiving enteral nutrition, this difference did not reach a statistically significant level. A systematic review and meta-analysis reported that sleep disturbances are common in surgical patients, and that preexisting sleep disturbance and anxiety are important risk factors for postoperative sleep disturbance [6]. The findings are consistent with this literature information; the decrease in PSQI scores in both groups in the postoperative period suggests that the postoperative recovery process may provide a certain improvement in sleep quality.

However, the fact that this improvement reached a statistically significant level in the group receiving enteral nutrition support supports the idea that nutritional support may contribute to postoperative sleep quality. However, the lack of a significant difference between the groups suggests that sleep disturbances are multifactorial and may not fully improve with short-term nutritional support alone. It has been reported that sleep-related breathing disorders can significantly increase in the postoperative period and that this is particularly related to anesthesia, analgesic use, and surgical stress [7]. These findings suggest that postoperative sleep quality is influenced by multiple physiological and environmental factors rather than a single variable. Although significant improvement was observed in the enteral nutrition group, the lack of a significant between-group difference supports the multifactorial nature of sleep regulation. The effects of postoperative analgesics and anesthetic agents on sleep architecture may have limited the impact of short-term nutritional support.

Nevertheless, nutritional support was expected to influence sleep quality due to the anti-inflammatory effects of omega-3 fatty acids, which have been shown to reduce cytokine production and suppress systemic inflammation [8]. The fact that the enteral nutrition formula used in the study contains omega-3 fatty acids [EPA/DHA] can be considered as a mechanism that may partially explain the improvement in sleep quality observed in the postoperative period. Reduction of the postoperative inflammatory response and associated stress may contribute positively to sleep. However, the fact that the difference between the groups did not reach a significant level suggests that the effects of omega-3 may be limited in short-term use.

In a randomized controlled trial conducted in patients with gastrointestinal cancer, it was shown that immunonutrition support given in the preoperative period reduced postoperative complications and positively affected general well-being [9]. These findings suggest that surgical stress and inflammatory response can be modulated through nutrition. In a prospective randomized study shown in the literature, nutritional intervention was applied with a fairly standard and "high-intensity" protocol in terms of dose and duration: Oral Impact, an immunonutrition-containing oral formula, was given at a dose of 1 L per day for 7 days preoperatively; in the "perioperative" arm, enteral nutrition was continued with the same immunonutrition formula in the postoperative period. In addition, postoperative enteral nutrition was initiated within the first 12 hours via jejunostomy/nasojejunal tube; the initial rate was 10 mL/hour and increased by 20 mL/hour each day to reach the target, and the energy target was defined as 28 kcal/kg/day [10]. This suggests that the "adequate dose-adequate duration" approach may be critical when interpreting positive clinical outcomes [complications/stay duration]: The fact that the regimen used in the study remained at a lower intensity compared to this protocol may be one of the possible reasons explaining why the difference between the groups did not reach significance.

The ESPEN [The European Society for Clinical Nutrition and Metabolism] guidelines emphasize that the primary aim of nutritional support in cancer patients is not only to increase

nutrient intake but also to maintain functional status, improve quality of life, and increase tolerance to treatment [11]. It is stated that early and adequate enteral nutrition can contribute to the healing process by reducing the systemic inflammatory response, especially in oncology patients undergoing surgery. In this study, a significant improvement in sleep quality was observed in the group receiving enteral nutritional support in the postoperative period, which is consistent with ESPEN's recommendations regarding the importance of nutrition in holistic patient management. However, the lack of a significant difference in the intergroup comparison suggests that the effect of nutritional support may depend on the duration of application, dose adequacy, and accompanying clinical factors, as stated in the guidelines. In addition, a multiparametric approach is needed rather than focusing on a single parameter. The practical guidelines published by ESPEN in 2021 particularly emphasize that nutritional support in cancer patients should be individualized and planned taking into account the stage of the disease, the treatment applied, and the functional status of the patient. The guidelines state that short-term nutritional interventions may have limited effects on some clinical and functional outcomes, whereas long-term and continuous nutritional support can provide more significant contributions to quality of life and functional outcomes [12]. Although a significant improvement in sleep quality was detected in the group receiving enteral nutritional support in our study, the fact that the difference between the groups was not statistically significant is consistent with this approach stated in the ESPEN 2021 guidelines. This suggests that sleep quality is shaped not only by nutrition but also by the interaction of numerous factors such as pain control, psychosocial status, and treatment-related side effects, and that nutritional support should be considered as part of this holistic approach.

In one study, the effect of improvements in nutritional content on sleep parameters was quantitatively evaluated; it was reported that balanced macronutrient intake could shorten the time to fall asleep by 10-15 minutes and increase the total sleep time by 20-30 minutes [13]. In this study, the reduction in total PSQI score from 7.10 ± 3.99 to 5.52 ± 4.33 in the enteral nutrition group indicates a clinically meaningful improvement in sleep quality. Although different measurement methods were used [objective parameters vs. subjective PSQI], both this study and Palesh et al. [14] demonstrated a positive contribution of nutrition to sleep. The greater improvements reported in that study may be related to longer intervention duration and more comprehensive dietary content. Palesh et al. assessed sleep objectively using actigraphy, measuring parameters such as total sleep time and nocturnal wakefulness, whereas our study used the PSQI, which evaluates subjective sleep quality, daytime function, and sleep latency. Each method has distinct strengths actigraphy reflects physiological sleep architecture, while PSQI captures perceived sleep quality and measurement tools may influence the reported prevalence and magnitude of sleep disturbances. Subjective scales were reported between 30–75% [15]. The authors emphasized that while self-report scales are important in reflecting the perceived sleep quality of patients, heterogeneity in measurement methods makes it difficult to compare results. The fact that sleep quality was assessed with the PSQI in this study is consistent with this methodological framework and is significant in terms of revealing the clinically perceived sleep problems of patients.

In a review study that addressed the issue from a psychoneuroimmunology perspective, it was stated that sleep disorders negatively affect immune functions by increasing the inflammatory response, and this situation may worsen the clinical course in chronic diseases [16]. In particular, short sleep duration and fragmented sleep have been reported to be associated with a significant increase in pro-inflammatory cytokine levels. The significant improvement in PSQI scores observed in patients receiving enteral nutrition support in our study shows that sleep quality can be modified with supportive interventions. However, the fact that biochemical inflammation markers were not evaluated in this study prevented the direct demonstration of this relationship, and this constitutes an important area of research for further studies. There are studies showing that poor nutritional status in cancer patients is associated with a significant decrease in quality of life scores, and this relationship is particularly evident in the areas of physical functions, fatigue, and sleep problems [17]. Improvements in nutritional status have been associated with measurable gains in quality of life. In this study, the significant improvement in sleep quality in the enteral nutrition group aligns with this evidence; however, the lack of a significant between-group difference suggests that sleep is only one dimension of quality of life and may not be markedly altered by short-term nutritional support alone. Thus, the impact of nutrition on sleep should be evaluated through longer-term, holistic approaches. Similarly, a meta-analysis of oral nutritional interventions in cancer patients reported small to moderate but consistent improvements in quality

of life, particularly when nutritional support was combined with other supportive treatments [18]. Although a statistically significant improvement in PSQI scores was observed in the group receiving enteral nutritional support in our study, the lack of a significant difference between the groups aligns with findings suggesting that the effect of nutritional interventions may be limited but clinically significant. These results suggest that nutritional support should be evaluated not in isolation, but within holistic treatment approaches, for its impact on multidimensional outcomes such as sleep quality.

Limitations of the Study

This study has several limitations, including its single-center design and relatively small sample size, which limit generalizability and statistical power. The two-week duration of enteral formula use may have been insufficient, and sleep quality was assessed only subjectively using the PSQI without objective methods such as actigraphy or polysomnography. Potential confounding factors such as psychological status, anxiety, pain, and analgesic use were not fully controlled. Future multicenter studies with larger samples, longer follow-up, and objective sleep assessments are needed. In conclusion, postoperative sleep quality significantly improved in patients receiving enteral nutritional support, while a similar but non-significant trend was observed in the control group. Given the multifactorial nature of postoperative sleep disturbances and evidence suggesting that nutritional factors may influence inflammation and sleep parameters, the observed 1.6-point reduction in PSQI scores indicates that even short-term nutritional support may have clinically meaningful benefits.

In conclusion, this study demonstrates that nutritional support can have positive effects on sleep quality in patients diagnosed with gynecological malignancies. The findings suggest that nutrition may play an important role not only in physical recovery but also in psychological and neurological well-being. Therefore, it is recommended that nutritional support be considered as part of holistic treatment approaches in oncology care; however, larger sample sizes and long-term studies are needed to provide more substantial evidence.

Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding

The authors received no financial support for the research and/or authorship of this article.

Ethics approval

The study was approved by the local ethics committee of Selcuk University (Ethic Approval Number: E-70632468-050.01-1141362)

Authors' contributions

B.G.Ö.: Conceptualization, methodology, formal analysis, investigation, data curation, writing - original draft, visualization, supervision, project administration. R.D.: Methodology, investigation, data curation, writing - review & editing. N.D.S.: Investigation, resources, data curation, writing - review & editing. F.Z.K.: Investigation, data curation, writing - review & editing. A.B.: Conceptualization, methodology, resources, writing - review & editing, supervision. Ç.Ç.: Conceptualization, methodology, resources, validation, writing - review & editing, supervision.

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