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RESEARCH ▪ ARAŞTIRMA

Malnutrition Risk Factors and Clinical Outcomes in Gynecology and Obstetric Patients

Jinekoloji ve Obstetri Hastalarında Malnütrisyon Risk Faktörleri ve Klinik Çıktılar

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ABSTRACT

Aim: Nutrition was a prerequisite for a healthy life, a basic human need, and a fundamental human right. The aim of this descriptive study is to examine the risk factors for malnutrition in obstetrics and gynecology patients and the relationship between malnutrition and clinical outcomes.

Subjects and Method: The research was carried out in a Gynecology and Obstetrics Branch Hospital between 30.10.2018 and 01.06.2022. The research sample consisted of patients who were assessed for malnutrition risk using the Nutritional Risk Screening-2002 (NRS-2002) form during the specified dates and had severe risk of malnutrition in all of the patients (risk score of ≥3, case group, n=82). An equal number of patients with mild/moderate malnutrition risk (score=1 and 2) and patients without risk were randomly selected using a computerized randomization process. General health, obstetric, admission characteristics, and laboratory findings were compared between the groups. A statistical significance level of $p<0.05$ was accepted.

Results: According to NRS-2002, the mean malnutrition risk score scores were 0.64±0.8 in the mild/moderate malnutrition risk group and 3.71±0.90 in the severe malnutrition risk group. The median age and body mass index of the group with a severe risk were higher and lower, respectively ($p<0.05$). The median length of hospital stay, weight loss, occurrence of surgical procedures, presence of infection, and presence of an oncological diagnosis were significantly higher in the group with a severe risk of malnutrition group compared to the other groups ($p<0.05$).

Conclusion: When evaluating women for malnutrition, care should be taken in case of age, length of hospital stay, weight loss, surgical procedure, presence of infection and oncological diagnosis. In case of impaired laboratory findings and normal body mass index value, it is important not to ignore the evaluation and to perform a comprehensive evaluation.

Keywords: Malnutrition, Nutritional Screening, Nutritional Support

ÖZET

Amaç: Beslenme, sağlıklı yaşamın ön koşulu, temel bir insan ihtiyacı ve temel bir insan hakkıdır. Tanımlayıcı türdeki araştırmanın amacı kadın hastalıkları ve doğum hastalarında malnütrisyon risk faktörlerini ve malnütrisyon ile klinik çıktılar arasındaki ilişkiyi incelemektir.

Bireyler ve Yöntem: Araştırma 30.10.2018-01.06.2022 tarihleri arasında bir kadın hastalıkları ve doğum branş hastanesinde gerçekleştirildi. Araştırmanın örneklemini belirtilen tarihlerde Nutritional Risk Screening-2002 (NRS-2002) formu

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kullanılarak malnütrisyon riski açısından değerlendirilen ve tamamı ağır malnütrisyona sahip olan hastalardan oluşturdu (risk skoru ≥3, vaka grubu, n=82). Hafif/orta derecede malnütrisyon riski olan (puan=1 ve 2) ve riski olmayan eşit sayıda hastalar, bilgisayarlı randomizasyon süreci kullanılarak rastgele seçildi. Grupların genel sağlık, obstetrik, yatış özellikleri ve laboratuvar bulguları karşılaştırıldı. İstatistiksel anlamlılık düzeyi p<0.05 olarak kabul edildi.

Bulgular: NRS-2002'ye göre ortalama malnütrisyon risk puanı skorları hafif/orta derecede malnütrisyon risk grubunda 0.64±0.8, ağır malnütrisyon risk grubunda ise 3.71±0.90 idi. Ciddi risk taşıyan grubun medyan yaşı daha yüksek, beden kütle indeksi ise daha düşüktü (p<0.05). Ağır malnütrisyon riski taşıyan grupta ortanca hastanede kalış süresi, kilo kaybı, cerrahi işlem geçirme durumu, enfeksiyon varlığı ve onkolojik tanı varlığı diğer gruplara göre anlamlı düzeyde daha yüksekti (p<0.05).

Sonuç: Kadınlar malnütriston açısından değerlendirilirken yaş, hastanede kalış süresi, vücut ağırlığı kaybı, cerrahi işlem uygulanması, enfeksiyon varlığı ve onkolojik tanı varlığı durumunda özenli davranılmalıdır. Bozulmamış laboratuvar bulgusu ve normal düzeyde beden kütle indeksi değeri durumunda değerlendirmenin göz ardı edilmemesi ve kapsamlı değerlendirmenin yapılması önemlidir.

Anahtar kelimeler: Yetersiz beslenme, beslenmenin taranması, beslenme desteği

INTRODUCTION

Malnutrition encompasses an imbalance, deficiency, or excess of nutrients, adversely impacting body composition, functions, and clinical outcomes (1). This condition correlates with heightened rates of nosocomial infections, increased mortality, morbidity, prolonged hospitalization, and escalated costs (2). Additionally, malnutrition extends its reach to affect activities of daily living and overall quality of life (3).

Given the association between malnutrition in hospitalized patients and these adverse consequences, evaluating the nutritional status of patients upon admission and devising appropriate plans are crucial alongside treating the underlying disease (4). This phase necessitates the identification of modifiable risk factors. Nutritional screening tests serve the purpose of diagnosing malnutrition to predict its impact on prognosis and ascertain whether nutritional support would be beneficial (5).

The Nutritional Risk Screening-2002 (NRS-2002) stands out as one of the most widely employed nutrition risk screening tools in hospitals globally (6). In Türkiye, all hospitalized patients undergo nutritional risk screening using the NRS-2002 form within the first 24 hours of admission and subsequently at regular intervals, typically weekly, depending on the patient's nutritional status. This systematic approach aims to detect inadequate nutrition, assess the risk of malnutrition, and pinpoint patients who may benefit from nutritional support (4).

A woman's nutritional status is a strong indicator of her well-being. A well-nourished woman has a strong immune system and nutrient reserves to compensate for the effects of infection while meeting additional nutritional needs during pregnancy or breastfeeding (7).

Women of reproductive age are particularly vulnerable to protein energy deficiency and malnutrition. Malnutrition is an underlying cause of significant maternal morbidity and mortality and an important risk factor for adverse birth outcomes (8). It was stated that the risk of malnutrition was significantly higher in the elderly, those with lower body mass index (BMI) and impaired biochemical profile, and those with oncological diagnosis (9). Female gender and higher age have been reported as independent risk factors for the development of inadequate nutrition (10). However, there is a dearth of literature on evaluating malnutrition in patients admitted to obstetrics and gynecology hospitals. Therefore, the objective of this descriptive study was to scrutinize the risk factors for

malnutrition and elucidate the relationship between malnutrition and clinical outcomes in obstetrics and gynecology patients.

SUBJECTS AND METHOD

The study population comprised patients admitted to an Obstetrics and Gynecology Branch Hospital between October 30, 2018, and June 1, 2022, with their malnutrition risk assessed using the NRS-2002 form (implemented via the automation system since October 30, 2018). Patients were categorized into three groups according to NRS-2002 score; none risk of malnutrition group (risk score=0), mild and moderate risk of malnutrition group (risk score=1 and 2), and severe risk of malnutrition group (risk score ≥3). The research sample included all patients evaluated for malnutrition risk using the NRS-2002 form during the specified dates and having a severe risk of malnutrition (risk score ≥3, case group, n=82). The group without malnutrition risk (risk score=0) and the group with mild and moderate malnutrition risk (risk score=1 and 2) were randomly selected from hospitalized patients with equal size to the group at severe risk of malnutrition. Randomization was done according to the NRS score. The diagnostic features of the patients were not monitored.

NRS-2002 form consists of "impaired nutritional status" and "disease severity" scores after preliminary evaluation, and a score of 0-3 is given for each section. In addition to scoring in patients over the age of 70, one (1) additional point is added to the score due to age. The total score range is 0-7. When evaluating the impaired nutritional status of the scoring, BMI, percentage of recent weight loss, and recent food intake are evaluated. According to the disease severity component, the disease is scored as mild, moderate and severe. NRS-2002 was developed by Kondrup et al. (4) in 2002, and is utilized in hospitals in compliance with Turkish Ministry of Health quality standards.

Inclusion criteria for the study included patients evaluated for malnutrition risk using the NRS-2002 form via the automation system and accessible parameter results. Exclusion criteria comprised patients with inaccessible parameter results. Data were collected using a data collection form developed from the literature (11,12) and obtained from the hospital's automation system. Files of patients lacking required data in the automation system were additionally reviewed. Institutional approval was secured for data usage. Due to this being a retrospective study, ethics committee approval was not received.

Statistical Analysis

Descriptive statistics, such as mean, standard deviation, and variable proportions, were calculated for patient characteristics. The Kruskal-Wallis test was employed for inter-group comparisons, with categorical variables analyzed via the chi-square test. Bonferroni-corrected post hoc analysis was utilized to discern differences in multi-cell tables. Spearman correlation analysis was conducted, with significance set at $p<0.05$.

RESULTS

The mean NRS-2002 total score for the group with mild and moderate risk of malnutrition was 0.64±0.8, with a mean disease severity score of 0.49±0.79, and with a mean impaired nutritional status score of 0.16±0.39. In contrast, the mean NRS-2002 total score for the group with severe risk of malnutrition was 3.71±0.90, with a mean disease severity score of 2.02±0.75, and with a mean impaired nutritional status score of 1.65±1.01. General health and obstetric features are provided in Table 1. The groups exhibited similarity in terms of comorbidities and medication usage.

A statistically significant difference between the groups was observed concerning the presence of an oncological diagnosis, with variations evident in each group ($\chi2=40.126$, $p<0.001$). Similarly, there was a significant difference in the ward of admission between the groups, primarily attributed to the none risk of malnutrition group ($\chi2=142.480$, $p<0.001$) (Table 2).

Table 1. General Health and Obstetrics Features

General Health and Obstetrics Features	None risk of malnutrition (Score=0)[a]		Mild and Moderate risk of malnutrition (Score= 1 and 2)[b]		Severe risk of malnutrition (Score ≥ 3)[c]		Total		
	n	Med (min-max)/ Mean Rank	n	Med (min-max)/ Mean Rank	n	Med (min-max)/ Mean Rank	n	Med (min-max)	Analysis*
Age (years)	83	31 (18-43)/ 98.6	83	33 (20-70)/ 120.7	83	37 (22-79)/ 155.7	249	34 (18-79)	χ^2=26.635 df=2 **p=0.000** (a-c)(b-c)
BMI (kg/m^2)	83	29 (21-48)/ 152.9	83	27 (20-40)/ 118.8	83	25 (14.7-40)/ 103.3	249	27 (14.7-48)	χ^2=20.655 df=2 **p=0.000** (a-b)(a-c)
Parity (n)	78	2 (0-9)/ 126.2	79	2 (0-11)/ 95.5	68	2 (0-9)/ 118.2	225	2 (0-11)	χ^2=10.982 df=2 **p=0.004** (a-b)
Gravidity (n)	78	2 (0-5)/ 126.2	79	1 (0-9)/ 95.9	68	2(0-7)/ 117.8	225	2 (0-9)	χ^2=9.539 df=2 **p=0.008** (a-b)
Living children (n)	78	2(0-5)/ 126.6	79	1 (0-7)/ 96.4	68	2(0-6)/ 116.7	225	2 (0-7)	χ^2=9.233 df=2 **p=0.010** (a-b)
Abortions (n)	78	0 (0-8)/ 114.0	79	0 (0-4)/ 111.4	68	0(0-2)/ 113.7	225	0 (0-8)	χ^2=.131 df=2 p=0.936
Curettage (n)	78	0 (0-8) / 114.9	79	0 (0-4)/ 110.4	68	0(0-3)/ 113.8	225	0 (0-8)	χ^2=.679 df=2 p=0.712
Stillbirth (n)	78	0 (0-2)/ 114.3	79	0 (0-4)/ 112.8	68	0(0-1)/ 111.8	225	0 (0-4)	χ^2=.471 df=2 p=0.790

**:The Kruskal-Wallis test, BMI: Body Mass Index*

Table 2. Hospitalization features

Hospitalization features	None risk of malnutrition (Score=0)[a]		Mild and Moderate risk of malnutrition (Score= 1 and 2)[b]		Severe risk of malnutrition (Score ≥ 3)[c]		Total		
	n	**Med (min-max)/ Mean Rank**	**n**	**Med (min-max)/ Mean Rank**	**n**	**Med (min-max)/ Mean Rank**	**n**	**Med (min-max)**	**Analysis***
Length of Hospital Stay (day)	83	2 (2-9)/ 118.3	83	2 (1-14)/ 99.3	83	5 (1-19)/ 157.5	249	2 (1-19)	2=31.223 df=2 **p=0.000** (a-c) (b-c)
Complication	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**Analysis****
Yes	7	8.4	8	9.6	11	13.3	26	10.4	χ^2=1.117
No	76	91.6	75	90.4	72	86.7	223	89.6	p=0.572
Weight loss									
Yes	0	0.0	1	1.2	37	44.6	38	15.3	χ^2=82.793 **p=0.000** (a-c) (b-c)
No	83	100.0	82	98.8	46	55.4	211	84.7	
Infection									
Yes	8	9.6	4	4.8	16	19.3	28	11.2	χ^2=9.014 **p=0.011** (a-c)
No	75	90.4	79	95.2	67	80.7	221	88.8	
Antibiotic use									
No	1	1.2	4	4.8	26	31.3	31	12.4	χ^2=73.117 **p=0.000** (a-c) (b-c)
Prophylactic	75	90.4	65	78.3	28	33.7	168	67.5	
Yes	7	8.4	14	16.9	29	34.9	50	20.1	

**:The Kruskal-Wallis test, **: The Chi-square test*

Table 2. Continued

Hospitalization features	None risk of malnutrition (Score=0)[a]		Mild and Moderate risk of malnutrition (Score= 1 and 2)[b]		Severe risk of malnutrition (Score ≥ 3)[c]		Total		
	n	**Med (min-max)/ Mean Rank**	**n**	**Med (min-max)/ Mean Rank**	**n**	**Med (min-max)/ Mean Rank**	**n**	**Med (min-max)**	**Analysis***
Length of Hospital Stay (day)	83	2 (2-9)/ 118.3	83	2 (1-14)/ 99.3	83	5 (1-19)/ 157.5	249	2 (1-19)	2=31.223 df=2 **p=0.000** (a-c) (b-c)
Surgical operation	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**Analysis****
Yes	1	1.2	2	2.4	24	28.9	27	10.8	χ^2=42.123 **p=0.000**
No	82	98.8	81	97.6	59	71.1	222	89.2	(a-c) (b-c)
Oncological Diagnosis									
Yes	0	0.00	7	8.4	27	32.5	34	13.7	χ^2=40.126 **p=0.000**
No	83	100.0	76	91.6	56	67.5	215	86.3	(a-b) (a-c) (b-c)
Blood Transfusion									
Yes	10	12.0	11	13.3	14	16.9	35	14.1	χ^2=0.864
No	73	88.0	72	86.7	69	83.1	214	85.9	p=0.649
Diet									
Normal diet	80	96.4	77	92.8	52	62.7	209	83.9	FisherExact
Special diet	3	3.6	6	7.2	28	33.7	37	14.9	**p=0.000**
Parenteral	0	0.0	0	0.0	3	3.6	3	1.2	(a-c) (b-c)
Hospitalization Unit									
Gynecology	0	0.0	21	25.3	19	22.7	40	16.1	χ^2= 142.480
Gyneco-oncology	0	0.0	2	2.4	21	25.3	23	9.2	**p=0.000**
Obstetrics	39	47.0	10	12.0	20	24.1	69	27.7	(a-b) (a-c)
Perinatology	44	53.0	15	18.1	13	15.7	72	28.9	
Infertility	0	0.0	35	42.2	10	12.0	45	18.1	

**:The Kruskal-Wallis test, **: The Chi-square test*

Laboratory findings presented in Table 3. Statistically significant correlations were identified between the NRS score and age (ρ=0.330, p=0.000), BMI (ρ=-0.182, p=0.004), length of hospital stay (ρ=0.352, p=0.000), feeding method (ρ=0.412, p=0.000), weight loss (ρ=0.559, p=0.000), presence of an oncological diagnosis (ρ=0.383, p=0.000), presence of infection (ρ=0.171, p=0.007), and development of complications (ρ=0.136, p=0.032), indicating statistically significant correlations (not specified in the table).

Table 3. Laboratory findings

Laboratory findings	None risk of malnutrition (Score=0)[a]		Mild and Moderate risk of malnutrition (Score= 1 and 2)[b]		Severe risk of malnutrition (Score ≥ 3)[c]		Total		
	n	Mean±SD	n	Mean±SD	n	Mean±SD	n	Mean±SD	Analysis*
WBC ($x10^3$ /µl)	83	10.80 (5.3-22.5) /153.67	83	8.10 (3.9-22.0) /95.24	83	9.60 (2.6-19.0) /126.08	249	9.60 (2.6-22.5)	χ^2=27.346 df=2 **p=0.000** (a-b) (a-c) (b-c)
Monocytes ($x10^3$ /µl)	83	0.40 (0.1-2.5) /127.63	83	0.40 (0.1-1.5) /103.87	83	0.49 (0.4-1.1) /143.50	249	0.40 (0.4-2.5)	χ^2=12.868 df=2 **p=0.002** (b-c)
Neutrophil ($x10^3$ /µL)	83	8,30 (0.9-20.3) /155.18	83	5,30 (0.7-14.5) /94.84	83	6,41 (1.7-17.0) /124.98	249	6,74 (0.7-20.3)	χ^2=29.127 df=2 **p=0.000** (a-b) (a-c) (b-c)
Lymphocyte ($x10^3$ /µL)	83	1,70 (0.50-3.38) /112.01	83	1,80 (0.50-3.40) /129.25	83	1,82 (0.30-3.38) /133.73	249	1,80 (0.30-3.40)	χ^2=4.212 df=2 p=0.122
Platelet ($x10^3$ /µL))	83	239 (119-561) /102.23	83	264(112-677) /130.15	83	275 (120-630) /142.61	249	260 (112-677)	χ^2=13.682 df=2 **p=0.001** (a-b) (a-c)
Hemoglobin (g/dL)	83	11,40 (7,2-15,3) /99.05	83	12,30 (8,2-15,4) /140.42	83	12,20 (8,0-34,2) /135.53	249	12,00 (7,2-34,2)	χ^2=16.362 df=2 **p=0.000** (a-b) (a-c)
Hematocrit (%)	83	34,00 (24,2-47,1) /94.83	83	37,80 (24,9-47,3) /146.27	83	37,00 (24,3-44,7) /133.90	249	36,40 (24,2-47,3)	χ^2=23.072 df=2 **p=0.000** (a-b) (a-c)
Ferritin (ng/mL)	11	18.40 (4-167) /8.36	4	16.50 (8-200) /9.00	3	124.00 (34-137) /14.33	18	24,20 (4-200)/	χ^2=2.993 df=2 p=0.224
Albumin (mg/dL)	24	29.95 (20.7-43.6) /36.79	21	32.00 (17.9-43.2) /40.52	51	36.70 (20.0-48.0) /57.29	96	34.30 (17.9-48.0)	χ^2=11.046 df=2 **p=0.004** (a-c)

**:The Kruskal-Wallis test; WBC: White Blood Cell, LDL: Low Density Lipoprotein, HDL: High Density Lipoprotein, BUN: Blood Urea Nitrogen, CRP: C-Reactive Protein*

Table 3. Continued

Laboratory findings	None risk of malnutrition (Score=0)[a]		Mild and Moderate risk of malnutrition (Score= 1 and 2)[b]		Severe risk of malnutrition (Score ≥ 3)[c]		Total		
	n	Mean±SD	n	Mean±SD	n	Mean±SD	n	Mean±SD	Analysis*
Cholesterol (mg/dL)	11	244.00 (73.0-327.0) /14.50	5	180.0 (139,5-272.0) /13.10	8	166.50 (138.0-215.0) /9.98	24	166.50 (138.0-215.0)	χ^2=2.480 df=2 p=0.289
Triglyceride (mg/dL)	5	175.00 (77.0-288.0) /12.50	5	17.00 (60.0-348.0) /12.10	10	111.00 (73.0 493.0) /8.70	20	125.35 (60.0-493.0)	χ^2=1.864 df=2 p=0.394
LDL (mg/dL)	11	138.00 (30.0-400.0) /12.45	5	90.20 (59.0-179.0) /11.80	7	87.00 (73.0-400.0) /11.43	23	110.00 (30.0-400.0)	χ^2=0.104 df=2 p=0.949
HDL (mg/dL)	11	53.00 (17.0-90.0) /13.23	5	51.00 (43.0-69.0) /10.80	7	54.00 (31.0-73.0) /10.93	23	51.00 (17.0-90.0)	χ^2= 0.694 df=2 p= 0.707
BUN (mg/dL)	81	8,00 (4.0-22.0) /97.97	77	10,00 (4.0-33.0) /116.87	71	10,60 (4.0-66.0) /132.42	229	9,00 (4.0-66.0)	χ^2=10.348 df=2 **p=0.006** (a-c)
Creatinine (mg/dL)	82	0.50 (0.0-1.0) /96.39	78	0.50 (0.0-1.0) /121.10	72	0.59 (0.0-4.0) /134.42	232	0.50 (0.0-4.0)	χ^2=13.505 df=2 **p=0.001** (a-c)
Uric Acid (mg/dL)	34	4.60 (1.0-6.9) /69.93	45	3.90 (0.3-6.8) /55.39	45	4.12 (1.5-10.7) /64.00	124	4.10 (0.3-10.7)	χ^2= 3.295 df=2 p=0.192
CRP (mg/dL)	24	15.40 (2.9-291.0) /34.63	17	8,10 (0.2-236.0) /32.35	28	18,00 (2.4-376.0) /36.93	69	16.93 (0.2-376.0)	χ^2=0.563 df=2 p=0.755
Total protein (g/dL)	19	57.00 (40.9-70.4) /24.97	16	61.15 (40.6-75.0) /30.84	23	60.00 (44.8-81.3) /32.30	58	57.10 (40.6-81.3)	χ^2=2.101 df=2 p=0.350

**:The Kruskal-Wallis test; WBC: White Blood Cell, LDL: Low Density Lipoprotein, HDL: High Density Lipoprotein, BUN: Blood Urea Nitrogen, CRP: C-Reactive Protein*

DISCUSSION

Nutrition stands as a cornerstone for a healthy life, representing a basic human need and an inherent human right. Inadequate nutrition, recognized as an independent risk factor, exerts detrimental effects on patients' clinical outcomes, quality of life, bodily functions, and autonomy (9). To mitigate the adverse clinical outcomes associated with inadequate nutrition, it's crucial to identify at-risk patients upon admission and provide them with additional nutritional support as part of their treatment regimen (13). Screening and assessing nutritional status serve as initial steps in nutrition management, laying the groundwork for nutritional support (14).

In this study, screening was conducted using the NRS-2002 tool. The mean total NRS-2002 score for the group with a severe malnutrition was found to be 3.71±0.90, with a mean disease severity score of 2.02±0.75, and a mean nutritional status score of 1.65±1.01. It was observed that the median age of women in the

research group was significantly higher among those with a high NRS-2002 score, with a positive, moderate, significant correlation between the NRS-2002 score and age. In the study of Hertlein et al. (11), a significant positive correlation was detected between age and NRS-2002 score.

It was determined by Gündüz et al. (15), that individuals classified as underweight based on BMI scoring had a significantly lower NRS-2002 score (15). In our study, the group with a malnutrition risk score ≥3 had a lower BMI. Since weight loss is a parameter included in the NRS-2002 scoring, it was also observed in our study that individuals with body weight loss have higher NRS-2002 scores. Additionally, a positive, moderate level, statistically significant correlation was found between the NRS-2002 score and weight loss, and a negative, low-level, statistically significant relationship was observed between BMI and NRS-2002 score. In the study of Bolayır et al. (16), it was determined that BMI was statistically significantly lower in patients with severe risk of malnutrition according to NRS-2002, and 50.9% of this group consisted of individuals with BMI>25 kg/m^2 (16). At the same time, it is reported that BMI value alone is not sufficient to eliminate the suspicion of malnutrition risk (17). The normal level of BMI in our study can be explained by the fact that the NRS risk score was not high (3.71±0.9), even in the group with a severe risk of malnutrition.

Our study revealed that the group at severe risk malnutrition experienced prolonged length of hospital stays, with a positive, moderate, significant correlation between the NRS-2002 risk score and duration of hospitalization. In the study of Nigatu et al. (18), malnutrition was found to be highly associated with long-term hospital stay. Prolonged hospital stays contribute to increased risk of hospital-acquired infections, disruption of patient flow and access to care due to bed shortages. Furthermore, the high prevalence of at-risk or malnourished patients presenting to the hospital adds to the workload, requiring increased nursing care due to higher infection rates, complications, pressure ulcers, medications, and decreased functional capacity. Strategically reducing hospital stays offers opportunities for increased revenue, cost reduction, decreased clinical variations, improved quality, and enhanced margins (18).

Heightened risk of malnutrition in patients undergoing surgical interventions, aligning with the well-established recognition of malnutrition as a risk factor for postoperative morbidity and mortality were reported (19). Moreover, patients scheduled for surgery require adequate nutrition to correct preoperative malnutrition and maintain postoperative nutritional status (20).

In the group with a severe risk of malnutrition, there was a significantly higher rate of infection compared to the group without risk, with a positive, low-level significant correlation between the NRS-2002 score and presence of infection. This was mirrored by a statistically significant difference in antibiotic use between the groups, with a higher median antibiotic use observed in the severe risk of malnutrition group. Inadequately nourished patients exhibited a higher number of comorbidities and presence of infection compared to well-nourished patients by the study of Nigatu et al. (18). In the study by Lee et al. (21), it was determined that malnutrition was associated with infectious outcomes (21). Infections are a global health problem, and inadequate nutrition plays a significant role in the development of infections. Evidence confirms that nutritional status is closely related to the host's immune response and resistance to infections. Malnutrition increases susceptibility to disease, and infections also affect nutritional status, contributing to a vicious cycle of inadequate nutrition. Malnutrition increases the risk of disease in the host, and relevant diseases have a negative impact on the host's metabolism by exacerbating nutritional status. Adequate nutrient intake is crucial for maintaining systemic immunity and may help in developing resistance against infections (22).

Among all disease groups, cancer patients demonstrated the highest rate of malnutrition, reflecting the multifactorial nature of malnutrition encountered by cancer patients at any disease stage (23). In one study, it was found that cancer patients are more likely to experience malnutrition (18). In our study, a positive, moderate, significant relationship was identified between the NRS-2002 score and presence of an oncological diagnosis, with a statistically significant difference observed between groups. Nutrition is one of the fundamental components of the treatment process in oncology patients. Nutritional status can affect the prognosis of the disease, the symptoms caused by the tumor and treatments, the response to antineoplastic therapies, and recovery (23).

Regarding nutrition type, the rate of normal diet intake was higher in the group without malnutrition risk, while specialized and parenteral diet intake rates increased with higher NRS-2002 scores and malnutrition risk. This trend is attributed to the support of nutrition for patients at risk of malnutrition.

When analyzed by hospital unit, admissions due to pregnancy were more prevalent in the group without malnutrition risk, likely due to the study's conduct in a specialized obstetrics hospital.

Statistically significant differences were noted between the groups in terms of white blood cell (WBC) and neutrophil values, with the predominance of pregnant women in the none risk of malnutrition group explaining this finding. The WBC count increases during pregnancy, primarily due to an increase in circulating neutrophils (24). Additionally, platelet, hemoglobin, and hematocrit values were significantly lower in the none risk of malnutrition group, likely influenced by physiological anemia of pregnancy and other factors. It appears that the physiological anemia of pregnancy and other factors may contribute to the lower platelet, hemoglobin, and hematocrit values in this group (24). Although anemia is mentioned in the literature as an indicator of malnutrition (25), our study suggests that it may not be an indicator of malnutrition in pregnant women due to the reasons mentioned above.

In our study, the albumin level was significantly lower in the none risk of malnutrition group. Serum albumin concentration is used as a marker to measure the amount of circulating proteins in the plasma (26). Serum albumin levels decrease starting from the first trimester, and this decrease gradually increases as pregnancy progresses (27). Similarly, lower blood urea nitrogen (BUN) and creatinine levels were observed in the none risk of malnutrition group due to increased glomerular filtration rate and dilution from increased plasma volume during pregnancy (28). The fact that the group without malnutrition consists of pregnant women explains our finding.

Overall, these findings underscore the complex interplay between nutritional status and various clinical parameters, emphasizing the importance of comprehensive nutritional assessment and support in patient care, particularly in populations vulnerable to malnutrition such as pregnant women and oncology patients.

In our study, the randomization of groups with no risk of malnutrition and those with mild and moderate malnutrition risk according to the NRS score was selected among all inpatients. Since we did not perform block randomization according to the diagnostic characteristics of the group at risk of severe malnutrition, this resulted in a non-homogeneous distribution among obstetrics, gynecology and gynecological oncology patients, which is the most important limitation of our study. Because there are differences in some physiological characteristics between pregnant and non-pregnant patients. In addition, since the evaluation of malnutrition status in the literature was mainly done in geriatric and oncology patients, we did not have the opportunity to compare it with our study results. Despite this, conducting our study in a gynecology and obstetrics hospital where the risk of malnutrition is lower contributed to the field.

In our study, the group with the severe risk of malnutrition, showed higher values in terms of age, length of hospital stay, weight loss, surgical procedures, presence of infection, and presence of oncological diagnosis, while laboratory findings were not sufficient to define malnutrition due to the hemodilution effect of pregnancy. Therefore, timely screening and comprehensive evaluation of malnutrition risk in patients from the gynecology and obstetrics department without impaired laboratory findings are important. When evaluating BMI, pre-pregnancy BMI value and the weight that should be gained during pregnancy should be considered. Providing appropriate nutritional support to patients at risk of malnutrition is crucial for recovery, improving quality of life, and cost-effectiveness. The evaluation of nutritional status and planning of nutritional support should be implemented through a multidisciplinary approach involving physicians, dietitians, and nurses.

Author contributions ▪ Yazarlık katkısı: *Study design: GKB, YEU; Data collection: GKB, SB; Data analysis: GKB, CK, YEU; Draft preparation: GKB, CK, YEU, SB; Critical review for content: GKB, CK, YEU, SB; All authors reviewed the results and approved the final version of the manuscript. ▪ Çalışmanın tasarımı: GKB, YEU; Çalışma verilerinin elde edilmesi: GKB, SB Verilerin analiz edilmesi: GKB, CK, YEU; Makale taslağının oluşturulması: GKB, CK, YEU, SB; İçerik için eleştirel gözden geçirme: GKB, CK, YEU, SB; Tüm yazarlar sonuçları gözden geçirdi ve makalenin son versiyonunu onayladı.*

Ethics approval ▪ Etik Kurul Onayı: *Institutional approval (Date:26.05.2022; No:06/28) has been obtained for the use of data. ▪ Kurum onayı (Tarih:26.05.2022; No:06/28) alınmıştır.*

Patient consent statement ▪ Hasta onam beyanı: *Patient consent statement was not obtained as it is a retrospective study. ▪ Retrospektif bir çalışma olduğundan hasta onam beyanı alınmamıştır.*

Conflict of interest ▪ Çıkar çatışması: *The authors declare that they have no conflict of interest. ▪ Yazarlar çıkar çatışması olmadığını beyan ederler.*

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