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Artikel Penelitian

HUBUNGAN ANTARA JENIS KANKER DENGAN DERAJAT MALNUTRISI BERDASARKAN KRITERIA GLIM PADA PASIEN KEMOTERAPI: STUDI POTONG LINTANG

ASSOCIATION BETWEEN CANCER TYPE AND GLIM-DEFINED MALNUTRITION IN PATIENTS UNDERGOING CHEMOTHERAPY: A CROSS-SECTIONAL STUDY

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A B S T R A K

Malnutrisi merupakan komplikasi yang sering terjadi pada pasien kanker dan berhubungan dengan luaran klinis yang lebih buruk.[1] Kriteria *Global Leadership Initiative on Malnutrition* (GLIM) menyediakan konsensus internasional untuk diagnosis malnutrisi.[2] Namun, bukti mengenai variasi derajat malnutrisi pada berbagai jenis kanker masih terbatas. Penelitian ini bertujuan untuk mengevaluasi hubungan antara jenis kanker dan derajat malnutrisi berdasarkan kriteria GLIM pada pasien kanker yang menjalani kemoterapi. Penelitian deskriptif dengan desain potong lintang ini dilakukan pada pasien kanker dewasa yang menjalani kemoterapi di Rumah Sakit Pendidikan Prof. dr. Chairuddin P. Lubis Universitas Sumatera Utara, Medan, Indonesia, antara Oktober 2025 hingga Januari 2026. Status gizi dinilai menggunakan kriteria GLIM. Hubungan antara jenis kanker dan derajat malnutrisi dianalisis menggunakan uji *Chi-Square*. Sebanyak 107 pasien dianalisis. Kanker paru merupakan jenis kanker terbanyak (42.1%), diikuti kanker payudara (38.3%), kanker ovarium (15.9%), dan kanker prostat (3.7%). Sebanyak 46.7% pasien mengalami malnutrisi, terdiri dari 22.4% malnutrisi sedang dan 24.3% malnutrisi berat. Prevalensi malnutrisi tertinggi ditemukan pada kanker paru (73.3%). Terdapat hubungan bermakna antara jenis kanker dan derajat malnutrisi ($p<0.001$). Kesimpulan: Malnutrisi sering ditemukan pada pasien kanker yang menjalani kemoterapi dan derajatnya bervariasi menurut jenis kanker.

A B S T R A C T

Malnutrition is a common complication in patients with cancer and is associated with poorer clinical outcomes.[1] The Global Leadership Initiative on Malnutrition (GLIM) criteria provide an international consensus for diagnosing malnutrition.[2] However, evidence regarding variations in malnutrition severity across different cancer types remains limited. Objective: This study aimed to evaluate the association between cancer type and malnutrition severity defined by the GLIM criteria among patients with cancer undergoing chemotherapy. Methods: This descriptive cross-sectional study was conducted among adult cancer patients receiving chemotherapy at Prof. dr. Chairuddin P. Lubis Universitas Sumatera Utara Hospital, Medan, Indonesia, between October 2025 and January 2026. Nutritional status was assessed using the GLIM criteria. The association between cancer type and malnutrition severity was analyzed using the chi-square test. Results: A total of 107 patients were included. Lung cancer was the most common malignancy (42.1%), followed by breast (38.3%), ovarian (15.9%), and prostate cancer (3.7%). Overall, 46.7% of patients were malnourished, including 22.4% with moderate and 24.3% with severe malnutrition. The highest prevalence of malnutrition was observed in lung cancer patients (73.3%). A significant association was found between cancer type and malnutrition severity ($p<0.001$). Conclusion: Malnutrition is common among patients with cancer undergoing chemotherapy, and its severity varies according to cancer types.

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INTRODUCTION

Cancer represents a major global health challenge and contributes substantially to morbidity and mortality worldwide.[1] According to the GLOBOCAN 2022 report from the *International Agency for Research on Cancer* (IARC), nearly 20 million new cancer cases and approximately 9.7 million cancer-related deaths were reported globally.[3] In addition to tumor progression, patients with cancer frequently experience metabolic alterations and treatment-related complications that may negatively affect clinical outcomes and quality of life.[4] These conditions also place cancer patients at increased risk of malnutrition.[1]

Malnutrition is a common complication in oncology patients, affecting approximately 20-70% of individuals with cancer depending on tumor type and disease stage.[5,6] Cancer-related malnutrition arises from complex interactions between tumor-induced metabolic changes, systemic inflammation, treatment-related adverse effects, and host physiological adaptations. These mechanisms may lead to elevated energy expenditure, enhanced protein breakdown, and progressive nutritional deterioration, particularly in patients undergoing chemotherapy.[6–9]

To standardize the diagnosis of malnutrition across diverse clinical populations, the Global Leadership Initiative on Malnutrition (GLIM) introduced a consensus-based diagnostic framework integrating phenotypic and etiologic components.[2] Liu et al. demonstrated that malnutrition identified using the GLIM criteria was significantly associated with higher complication rates and poorer clinical outcomes in cancer patients.[10] However, Huo et al. reported that the GLIM criteria identified fewer malnourished patients and showed lower agreement with the Patient-Generated Subjective Global Assessment (PG-SGA), suggesting potential variability in its clinical performance.[11] These discrepancies indicate that the clinical implications of GLIM-defined malnutrition may vary across malignancies and settings.

Despite the growing application of the GLIM criteria in oncology research, limited evidence has explored whether the severity of GLIM-defined malnutrition differs across specific cancer types, particularly among patients receiving chemotherapy. To our knowledge, studies exploring tumor-specific variations in malnutrition severity using the GLIM criteria remain limited. Therefore, this study aimed to evaluate the association between cancer type and malnutrition severity defined by the GLIM criteria among patients undergoing chemotherapy.

METHODS

This descriptive cross-sectional study was conducted among adult patients with cancer undergoing chemotherapy at the chemotherapy unit of Prof. dr. Chairuddin P. Lubis Universitas Sumatera Utara Hospital, Medan, Indonesia, between October 2025 and January 2026. Ethical approval for the study was obtained from the Health Research Ethical Committee of Universitas Sumatera Utara (No. 1014/KEPK/USU/2025).

In this study, adult patients with cancer undergoing chemotherapy were consecutively

recruited during the study period. Clinical information regarding cancer type was obtained from electronic medical records. Nutritional status was assessed using the Global Leadership Initiative on Malnutrition (GLIM) criteria following the recommended two-step diagnostic approach. Anthropometric measurements, including body weight and height, were performed using standardized procedures, and relevant clinical information such as recent weight loss and reduction in food intake was collected through patient interviews. The severity of malnutrition was subsequently classified as moderate or severe according to GLIM recommendations.

Statistical analyses were performed using SPSS software version 20. Descriptive statistics were used to summarize the distribution of cancer types and the prevalence of malnutrition according to the GLIM criteria. Categorical variables were presented as frequencies and percentages. The association between cancer type and GLIM-defined malnutrition severity was evaluated using the chi-square test, with statistical significance defined as $p < 0.05$.

RESULTS

A total of 107 patients undergoing chemotherapy were included in the analysis. The distribution of cancer types is presented in Table 1. Lung cancer was identified in 45 patients (42.1%), followed by breast cancer in 41 patients (38.3%), ovarian cancer in 17 patients (15.9%), while prostate cancer represented the smallest proportion, with 4 patients (3.7%). Lung and breast cancer together accounted for 86 of the 107 patients (80.4%).

Table 1. Distribution of Cancer Types

Cancer Type	n	%
Lung cancer	45	42.1
Breast cancer	41	38.3
Ovarian cancer	17	15.9
Prostate cancer	4	3.7
Total	107	100

The overall distribution of malnutrition according to the GLIM criteria is shown in Table 2. Of the 107 patients, 57 (53.3%) were classified as not malnourished. A total of 50 patients (46.7%) met the criteria for malnutrition. Among these, 24 patients (22.4% of the total sample) had moderate malnutrition and 26 patients (24.3%) had severe malnutrition. Moderate malnutrition accounted for 48% (24 of 50) of all malnutrition cases, while severe malnutrition accounted for 52% (26 of 50).

Table 2. Distribution of GLIM-Defined Malnutrition According to Cancer Type

Cancer Type	No Malnutrition n (%)	Moderate n (%)	Severe n (%)	Total n
Lung cancer	12 (26.7)	16 (35.6)	17 (37.8)	45
Breast cancer	31 (75.6)	3 (7.3)	7 (17.1)	41
Ovarian cancer	10 (58.8)	5 (29.4)	2 (11.8)	17
Prostate cancer	4 (100)	0 (0)	0 (0)	4
Total	57 (53.3%)	24 (22.4%)	26 (24.3%)	107

Among patients with lung cancer (n = 45), 12 (26.7%) had no malnutrition, 16 (35.6%) had moderate malnutrition, and 17 (37.8%) had severe malnutrition. The combined prevalence of malnutrition in lung cancer patients was 73.3% (33 of 45). Of the 24 patients with moderate malnutrition, 16 (66.7%) had lung cancer. Of the 26 patients with severe malnutrition, 17 (65.4%) had lung cancer.

Among patients with breast cancer (n = 41), 31 (75.6%) had no malnutrition, 3 (7.3%) had moderate malnutrition, and 7 (17.1%) had severe malnutrition. The total prevalence of malnutrition in breast cancer patients was 24.4% (10 of 41). Breast cancer accounted for 12.5% (3 of 24) of moderate malnutrition cases and 26.9% (7 of 26) of severe malnutrition cases.

In patients with ovarian cancer (n = 17), 10 (58.8%) had no malnutrition, 5 (29.4%) had moderate malnutrition, and 2 (11.8%) had severe malnutrition. The overall prevalence of malnutrition in ovarian cancer patients was 41.2% (7 of 17). Ovarian cancer represented 20.8% (5 of 24) of moderate malnutrition cases and 7.7% (2 of 26) of severe malnutrition cases.

All four prostate cancer patients (100%) had no malnutrition. No cases of moderate or severe malnutrition were identified in this subgroup. Prostate cancer patients did not contribute to the total number of moderate or severe malnutrition cases.

The chi-square test demonstrated a statistically significant association between cancer type and GLIM-defined malnutrition severity ($p < 0.001$) (Table 3). When individual comparisons were examined, lung cancer was significantly associated with higher malnutrition severity ($p < 0.001$), whereas breast cancer showed a significantly lower distribution of malnutrition compared with non-breast cancers ($p = 0.001$). No statistically significant association was identified for ovarian cancer ($p = 0.394$) or prostate cancer ($p = 0.162$).

Table 3. Association Between Cancer Type and Malnutrition Severity

Comparison	p-value
Overall comparison	< 0.001[1]
Lung vs Non-Lung	< 0.001[1]
Breast vs Non-Breast	0.001[1]
Ovarian vs Non-Ovarian	0.394[1]
Prostate vs Non-Prostate	0.162[1]

[1]chi-square test

DISCUSSION

This study demonstrated a significant association between cancer type and the severity of malnutrition defined by the GLIM criteria among patients undergoing chemotherapy. Nearly half of the patients included in this study were classified as malnourished, with severe malnutrition slightly exceeding moderate malnutrition. These findings highlight the substantial burden of nutritional impairment among oncology patients receiving systemic therapy and emphasize the importance of routine nutritional assessment in this population.

The overall prevalence of malnutrition observed in this study (46.7%) is consistent with previous reports indicating that 20-70% of patients with cancer experience malnutrition depending on tumor type, disease stage, and assessment methods.[6,12] The application of the GLIM criteria provides a standardized diagnostic framework that integrates phenotypic

indicators such as weight loss, low body mass index, and reduced muscle mass with etiologic factors including inflammation and disease burden.[2] The relatively high proportion of severe malnutrition observed in this study suggests that nutritional deterioration in patients undergoing chemotherapy may be clinically significant and requires early identification and intervention.

A particularly notable finding of this study was the markedly higher prevalence of malnutrition among patients with lung cancer. This observation is consistent with previous evidence indicating that lung cancer is strongly associated with systemic inflammation and cancer-associated cachexia.[13] Tumor-induced inflammatory responses involving cytokines such as interleukin-6 and tumor necrosis factor-α, may increase resting energy expenditure, suppress appetite, and accelerate skeletal muscle proteolysis.[14,15] These mechanisms contribute to progressive weight loss and muscle wasting commonly observed in lung cancer patients.[13,15]

In contrast, breast cancer patients demonstrated a considerably lower prevalence of malnutrition. Previous studies have reported similar findings, particularly in patients with early or non-metastatic breast cancer.[16] Compared with malignancies affecting the respiratory or gastrointestinal systems, breast tumors are less likely to cause direct anatomical or metabolic disturbances that impair oral intake.[17] Furthermore, the systemic inflammatory burden associated with breast cancer is generally lower than that observed in highly catabolic malignancies such as lung or pancreatic cancer.[16]

Patients with ovarian cancer in this study exhibited an intermediate prevalence of malnutrition. Nutritional deterioration in ovarian cancer has been associated with several clinical factors, including abdominal distension, ascites, early satiety, and reduced oral intake.[18] These manifestations may limit food consumption and contribute to progressive weight loss. However, the association between ovarian cancer and malnutrition severity did not reach statistical significance in this study, which may be related to relatively small sample size of this subgroup.

Interestingly, none of the prostate cancer patients included in this study were classified as malnourished. Prostate cancer, particularly in earlier stages or during hormonal therapy, is generally not associated with substantial weight loss or a systemic catabolic response. Previous studies suggest that cancer-related cachexia and severe nutritional deterioration are more commonly observed in advanced or metastatic prostate cancer.[19,20] Nevertheless, the interpretation of this finding should be approached with caution due to the limited number of prostate cases included in the analysis.

The significant association between cancer type and malnutrition severity observed in this study underscores the biological heterogeneity of cancer-related malnutrition. Nutritional impairment in oncology is not a uniform condition but rather reflects complex interactions between tumor biology, systemic inflammation, tumor location, and treatment-related toxicities. Tumors characterized by high inflammatory activity are more likely to induce metabolic dysregulation, including increased

energy expenditure, anorexia, and accelerated skeletal muscle catabolism, which are key mechanisms underlying malnutrition in cancer.[21–23]

The findings of this study provide additional evidence that the severity of malnutrition varies across cancer types. While previous studies have mainly reported the overall prevalence of malnutrition in oncology populations, this study highlights tumor-specific differences in malnutrition risk using the GLIM criteria among patients undergoing chemotherapy. These findings may contribute to a better understanding of how tumor biology and inflammatory burden influence nutritional deterioration in clinical oncology settings.

From a clinical perspective, these findings highlight the importance of routine nutritional assessment in oncology practice, particularly for patients with malignancies associated with higher inflammatory and metabolic burdens, such as lung cancer. Early identification of malnutrition using standardized criteria such as GLIM may facilitate timely nutritional intervention and potentially improve treatment tolerance, quality of life, and clinical outcomes in patients undergoing chemotherapy.

This study has several limitations. First, the cross-sectional design does not allow causal relationships between cancer type and malnutrition severity to be established. Second, several potentially relevant clinical variables, including cancer stage, treatment intensity, and inflammatory biomarkers, were not included in the analysis. In particular, cancer stage was not assessed, which may influence nutritional status and act as a confounding factor. Third, multivariate analysis was not performed to adjust these potential confounders. Therefore, future studies using multivariate analysis are needed to evaluate the independent effect of cancer type on malnutrition severity. In addition, the relatively small number of patients with certain cancer types may limit the generalizability of subgroup findings.

Future studies with larger sample sizes and longitudinal designs are needed to further clarify the relationship between cancer type and nutritional deterioration. Such studies may help elucidate the underlying mechanisms linking tumor biology and malnutrition severity in oncology patients.

Despite these limitations, this study contributes to the growing body of evidence highlighting the heterogeneity of cancer-related malnutrition. By applying the GLIM criteria in patients undergoing chemotherapy, this study provides additional insight into tumor-specific patterns of nutritional risk and supports the integration of systematic nutritional assessment into routine oncology care.

CONCLUSION

This study demonstrates a significant association between cancer type and malnutrition severity defined by the GLIM criteria among patients undergoing chemotherapy. Nearly half of the patients were classified as malnourished, with lung cancer showing the highest prevalence. These findings highlight the heterogeneous nature of cancer-related malnutrition and emphasize the importance of early and systematic nutritional assessment using standardized criteria such as

GLIM and support the need for tumor-specific approaches to nutritional management in patients receiving chemotherapy.

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