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Comparison between patients who have undergone cancer surgery based on MST value: a retrospective study

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ABSTRACT

Introduction: Malnutrition is a prevalent concern in oncologic surgery patients, often exacerbated by the effects of cancer and its treatments. Malnutrition is associated with poor clinical outcomes, including higher mortality rates, longer hospital stays, and increased complications. The Malnutrition Screening Tool (MST) is a valuable method for identifying malnutrition risk at hospital admission. This study aims to assess the prevalence of malnutrition using the MST and evaluate its prognostic value in relation to clinical outcomes, such as length of stay (LOS), inflammatory markers, and mortality in oncologic surgery patients.

Methods: A retrospective cohort study was conducted at Dr. Wahidin Sudirohusodo Hospital in Makassar, Indonesia, from January 2022 to January 2024. Nutritional status was assessed using the MST, by comparing MST scores of less than 2 and MST score of 2 or higher were considered at risk of malnutrition, and key clinical outcomes—LOS, inflammatory markers (Neutrophil-to-Lymphocyte Ratio [NLR]), serum albumin, total lymphocyte count (TLC), and Prognostic Nutritional Index (PNI)—were analyzed. Statistical comparisons were performed using chi-square tests and t-tests, with statistical significance set at $p < 0.05$.

Results: Among the 284 patients, 33.8% were classified as malnourished (MST ≥2). Patients with higher MST scores had significantly worse clinical outcomes, including higher mortality (33.3% vs. 12.3% for MST <2, $p < 0.001$). Malnourished patients exhibited poorer inflammatory and nutritional markers, with higher NLR (6.13 vs. 4.68, $p = 0.05$), lower albumin (3.0 g/dL vs. 3.3 g/dL, $p = 0.004$), and lower PNI (36.4 vs. 41.8, $p < 0.001$). No significant difference was found in LOS between the two groups (median 10 days vs. 9 days, $p = 0.732$).

Conclusion: Malnutrition, as identified by the MST, is strongly associated with increased mortality and worsened inflammatory and nutritional markers in oncologic surgery patients. These findings underscore the need for routine nutritional screening and timely interventions to improve clinical outcomes in this high-risk population.

KEYWORDS

Surgical recovery, health, immunological impact, nutritional risk, clinical recovery.

INTRODUCTION

Hospital malnutrition is a prevalent issue, particularly among oncologic surgery patients, where the effects of cancer and its treatments can exacerbate nutritional decline[1,2]. Malnutrition in this population is associated with poor clinical outcomes, including increased risk of postoperative complications, longer hospital stays, and higher mortality rates. Despite the well-documented impact of malnutrition, it often goes undiagnosed and untreated in clinical settings, which can significantly impair recovery and overall prognosis[3-6].

The Malnutrition Screening Tool (MST) has emerged as a valuable and straightforward method to screen patients for malnutrition risk upon hospital admission. Its use allows for the early identification of patients who may benefit from nu-

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tritional interventions, potentially improving their clinical outcomes[7-9].

This study focuses on evaluating the prevalence of malnutrition in oncologic surgery patients using the MST as a screening tool. The study also aims to explore the prognostic value of MST in relation to key clinical outcomes, including length of stay, inflammatory markers, and mortality. By examining the relationship between malnutrition and patient outcomes, we are able to underscore the importance of routine malnutrition screening and timely nutritional interventions in surgical oncology.

METHODS

Study Design and Study Population: This retrospective cohort study was conducted at Dr. Wahidin Sudirohusodo Hospital, Makassar, Indonesia, covering the period from January 2022 to January 2024.The study population consisted of patients who had undergone oncologic surgery at the hospital during the study period. Eligible participants were adults aged 18 years or older, who had a minimum hospital stay of 14 days and had complete clinical and laboratory data, including routine blood tests and MST scores. Patients who did not undergo MST screening or whose medical records were incomplete were excluded from the analysis. After applying the inclusion and exclusion criteria, a total of 284 patients were included in the final analysis.

Variables and Data Collection: Nutritional status was assessed using the Malnutrition Screening Tool (MST), a widely used instrument for identifying patients at risk of malnutrition. Patients with an MST score of 2 or higher were considered at risk of malnutrition. In addition to MST, key nutritional and inflammatory markers were evaluated, including the Prognostic Nutritional Index (PNI), serum albumin levels, and the Neutrophil-to-Lymphocyte Ratio (NLR). The PNI was calculated based on the following formula: albumin concentration (g/L) plus five times the total lymphocyte count (TLC). Serum albumin levels were used to categorize patients into mild, moderate, or severe hypoalbuminemia, and the NLR was derived by dividing the neutrophil count by the lymphocyte count. Data collection was carried out by reviewing patients' medical records. Variables of interest included demographic information, laboratory results, and clinical outcomes such as length of stay and mortality. The length of stay was measured in days, while mortality was assessed by the outcome at discharge.

Research Permission and Ethical Clearance: This research was conducted with approval from the Ethical Committee of Dr. Wahidin Sudirohusodo Hospital. Ethical clearance was obtained to ensure patient confidentiality, and no identifying patient information was disclosed. All data used were anonymized and stored securely, in compliance with hospital regulations and ethical standards.

Statistical analysis: Descriptive statistics were used to summarize patient characteristics, and results for continuous variables were presented as medians with interquartile ranges, while categorical variables were expressed as frequencies and percentages. Comparisons between groups were performed using the chi-square test for categorical variables and t-tests or Mann-Whitney U tests for continuous variables, depending on the distribution of the data. Statistical significance was defined as a p-value of less than 0.05.

RESULTS

A total of 3881 oncologic surgery patients were initially identified during the study period at Dr. Wahidin Sudirohusodo Hospital. After applying exclusion criteria, including age over 59 years and length of hospital stay less than seven days, 505 patients remained. Further exclusions were made due to incomplete data, leaving 284 patients in the final analysis.

Table 1. Baseline characteristics of the study patients

Age, year	45 [37, 52]
Sex	
Men	84 (29.6)
Woman	200 (70.4)
Height, cm	155 [150, 160]
Weight, kg	50 [44, 59]
BMI, kg/m2	20.8 [18.3, 23,6]

Education Status	
No Education	19 (6.7)
Elementary	65 (22.9)
Secondary	56 (19.7)
High School	106 (37.3)
Diploma	4 (1.4)
Bachelor	34 (12)

Data are presented as n (%) or median [interquartile range].
BMI, Body Mass Index; MST, Malnutrition Screening Tool; MNT, Medical Nutrition Therapy; LOS, Length of Stay; NLR, Neutrophil to Lymphocyte Ratio; TLC, Total Lymphocyte Count; PNI, Prognostic Nutritional Index.

Table 1 continuation. Baseline characteristics of the study patients

Occupation Status	
Unemployed	169 (59.5)
Student	5 (1.8)
Employee	42 (14.8)
Self-Employee	68 (23.9)
Marital Status	
Unmarried	37(13)
Married	235 (82.7)
Widowed	12 (4.2)
MST	
<2	187 (65.8)
≥2	96 (33.8)
Type of Cancer	
Head Cancer	54 (19)
Lymphoma	40 (14.1)
Thyroid Cancer	46 (16.2)
Breast Cancer	100 (35.2)
Orthopaedic	44 (15.5)

Metastasized	
No.	264 (93)
Yes	20 (7.0)
Surgery	
No.	264 (93)
Yes	20 (7.0)
Chemotherapy	
No.	229 (80.6)
Yes	55 (19.4)
MNT	
No.	227(79.9)
Yes	57 (20.1)
LOS	10 [7,16]
Mortality	
No.	229 (80.6)
Yes	55 (19.4)
NLR	5.08 [2.47,9.97]
Albumin	3.2 [2.8, 3.6]
TLC	1505 [1008, 2139]
PNI	40.4 [34.1, 45.4]

Data are presented as n (%) or median [interquartile range].
BMI, Body Mass Index; MST, Malnutrition Screening Tool; MNT, Medical Nutrition Therapy; LOS, Length of Stay; NLR, Neutrophil to Lymphocyte Ratio; TLC, Total Lymphocyte Count; PNI, Prognostic Nutritional Index.

The median age of the patients was 45 years (IQR: 37-52 years), with a majority being female (70.4%). The median body mass index (BMI) was 20.8 kg/m² (IQR: 18.3-23.6), and the median length of stay (LOS) was 10 days (IQR: 7-16 days). Of the total, 65.8% of patients had an MST score below 2, indicating a lower risk of malnutrition, while 33.8% had an MST score of 2 or higher, suggesting a higher risk of malnutrition. Among the cancers present, breast cancer was the most common (35.2%), followed by head and neck cancers (19%), and thyroid cancer (16.2%).

Among patients with an MST score of 2 or higher, there was a significantly higher prevalence of lymphoma (24%, compared to 9.1% in those with MST <2) and a notably higher mortality rate (33.3% vs. 12.3% for MST <2) ($p < 0.001$). Furthermore, patients with an MST score of 2 or higher were more likely to receive medical nutrition therapy (32.3% compared to 13.9% for MST <2). However, there was no significant difference in the length of stay between the two groups (median of 9 days for MST <2 vs. 10 days for MST ≥2, $p = 0.732$). In terms of laboratory parameters, patients with an MST score of 2 or higher had poorer outcomes in several markers, including a higher Neutrophil-to-Lymphocyte Ratio (NLR) (6.13 vs. 4.68, $p = 0.05$), lower albumin levels (3.0 g/dL vs. 3.3 g/dL, $p = 0.004$), and lower total lymphocyte counts (1221 vs. 1626, $p = 0.005$). The Prognostic Nutritional Index (PNI) was also lower in patients with an MST score of 2 or higher (36.4 vs. 41.8, $p < 0.001$), indicating a worse nutritional status and prognosis in this group.

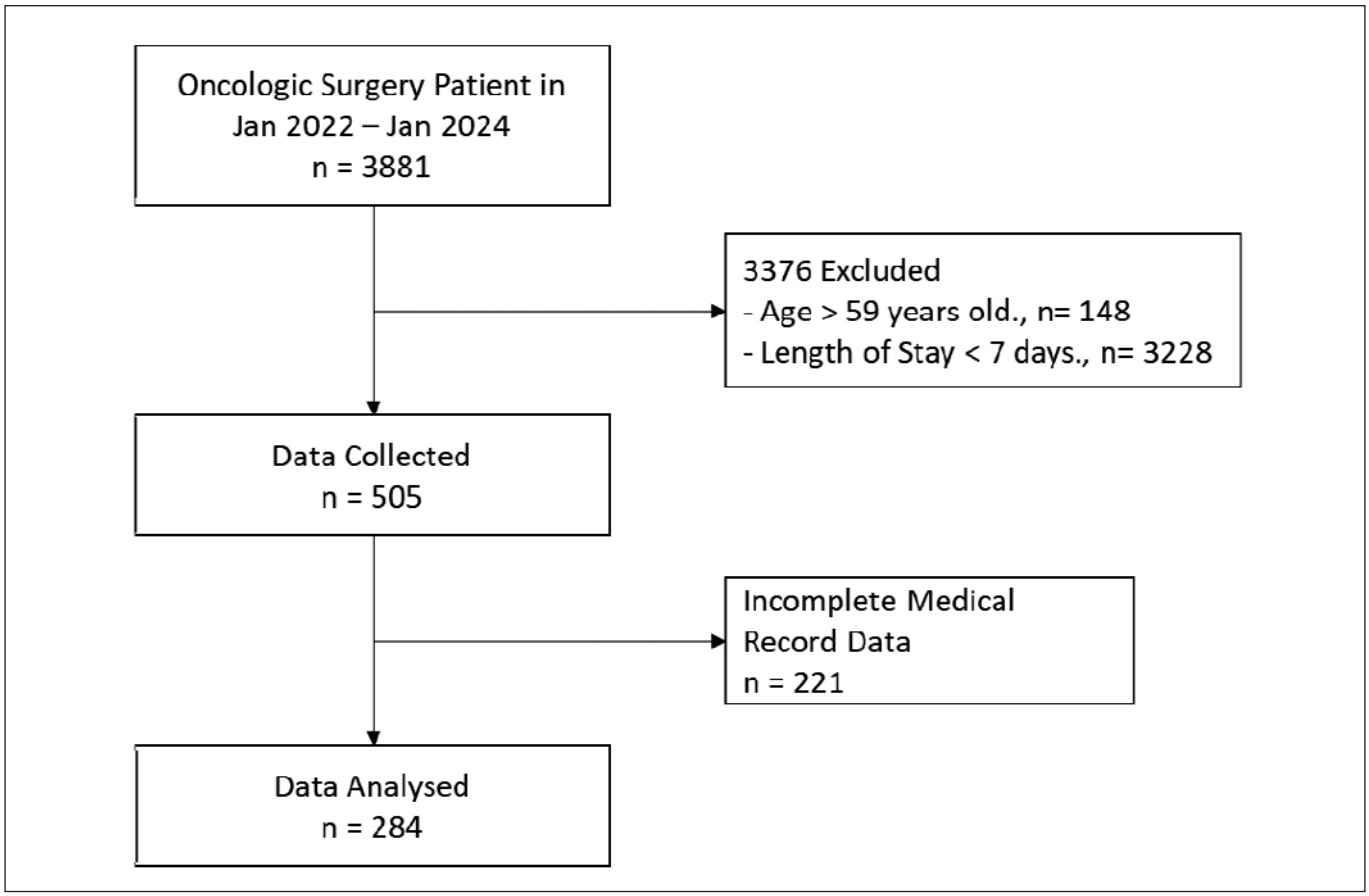

Figure 1. Flowchart of the Study

DISCUSSION

The findings from this study underscore the significant role of malnutrition in influencing clinical outcomes among oncologic surgery patients. Using the Malnutrition Screening Tool (MST), our study identified that 33.8% of the patients were at high risk of malnutrition (MST score ≥2), a prevalence consistent with previous studies that highlight malnutrition as a common issue in cancer patients undergoing surgery.

One of the most important outcomes of this study is the strong association between higher MST scores and increased mortality. Our results show that patients with an MST score of 2 or higher had a significantly higher mortality rate compared to those with lower scores. These findings align with earlier research, which demonstrates that malnutrition negatively impacts survival in cancer patients. The high mortality rate in malnourished patients could be attributed to several mechanisms, including impaired immune function, increased vulnerability to infections, and reduced tolerance to cancer therapies such as chemotherapy and radiation[1,10,11].

In addition to mortality, we observed significant differences in key nutritional and inflammatory markers between patients with higher and lower MST scores. Patients with MST scores ≥2 had higher Neutrophil-to-Lymphocyte Ratios (NLR), lower albumin levels, lower Prognostic Nutritional Index (PNI) and reduced total lymphocyte counts (TLC), all of which indicate a worsened inflammatory and nutritional status. These findings are consistent with prior studies that have identified NLR and albumin as important prognostic indicators in oncologic patients. High NLR is often associated with a systemic inflammatory response, which is a known contributor to cancer cachexia and poor outcomes in surgical patients. Meanwhile, hypoalbuminemia reflects both nutritional risk and systemic inflammation, further compromising the patient's ability to recover[12-17].

Interestingly, our study did not find a significant relationship between MST scores and length of stay (LOS). This result diverges from existing literature, which often suggests that malnourished patients have extended hospital stays due to complications such as delayed wound healing and infections[4,5,18]. One possible explanation for this discrepancy could be the intensive medical and nutritional support provided during hospitalization, which might have mitigated the length of stay, regardless of the patient's nutritional status at admis-

Table 2. Correlation between MST with type of cancer, clinical outcome, and laboratory parameters

	MST<2 (n=187)	MST ≥2 (n=96)	p Value
Type of Cancer			
Head Cancer	33 (17.6)	21 (21.9)	0.002
Lymphoma	17 (9.1)	23 (24)	
Thyroid Cancer	38 (20.3)	8 (8.3)	
Breast Cancer	68 (36.4)	31(32.3)	
Orthopaedic	31(16.6)	13 (13.5)	
MNT			
No	161 (86.1)	65 (67.7)	<0.001
Yes	26 (13.9)	31 (32.3)	
LOS	9 [7.15]	10 [7.16]	0.732
Mortality			
No	164 (87.7)	64 (66.7)	<0.001
Yes	23 (12.3)	32 (33.3)	
NLR	4.68 [2.25, 9.54]	6.13 [3.32, 11.58]	0.05
Albumin	3.3 [2.9,3.7]	3.0 [2.7, 3.5]	0.004
TLC	1626 [1141, 2168]	1221[834, 2089]	0.005
PNI	41.8 [35.9,46.9]	36.4 [31.9,43.5]	<0.001

Data are presented as n (%) or median [interquartile range].
BMI, Body Mass Index; MST, Malnutrition Screening Tool; MNT, Medical Nutrition Therapy; LOS, Length of Stay; NLR, Neutrophil to Lymphocyte Ratio; TLC, Total Lymphocyte Count; PNI, Prognostic Nutritional Index.

sion. Additionally, factors such as the type of surgery and post-operative care may have played a more decisive role in determining LOS in our cohort[1,3].

Another key finding from our study is the association between higher MST scores and the likelihood of receiving medical nutrition therapy (MNT). Patients with an MST score of 2 or greater were more likely to receive MNT, reflecting the proactive use of nutritional support in patients identified as malnourished or at risk. This emphasizes the importance of early screening using tools like MST to identify patients who would benefit from nutritional interventions[9,19]. However, despite receiving MNT, these patients still exhibited poorer clinical outcomes, suggesting that timely nutritional support is critical but may not fully mitigate the adverse effects of advanced malnutrition[1,3].

This study has several strengths. First, the use of the MST as a validated and simple screening tool ensures reliable identification of malnutrition risk. Second, the inclusion of key prognostic indicators, such as NLR, albumin, and PNI, provides a comprehensive view of the interplay between malnutrition and systemic inflammation. However, there are also limitations to consider. The retrospective nature of the study introduces potential biases, particularly in the completeness of medical records. Additionally, the lack of control over other variables, such as pre-hospital nutritional status and differences in cancer types and treatments, may limit the generalizability of the findings.

CONCLUSION

In conclusion, the results of this study highlight the critical need for routine malnutrition screening in oncologic surgery patients. Malnutrition, as identified by the MST, is strongly associated with increased mortality and worsened inflammatory and nutritional markers, underscoring its prognostic value. Early identification and intervention could potentially improve clinical outcomes, although further prospective studies are needed to validate these findings and explore more targeted nutritional interventions.

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