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Hospital malnutrition and stroke: a study of nutritional risk and patient outcomes

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ABSTRACT

Introduction: Hospital malnutrition is a prevalent issue among stroke patients, with significant impacts on immune function and clinical outcomes. Malnutrition is associated with poor outcomes such as increased complications, prolonged recovery, and higher mortality. This study aims to assess the prevalence of malnutrition using the Malnutrition Screening Tool (MST) and its association with clinical outcomes, including length of stay (LOS), inflammatory markers, and mortality.

Methods: A retrospective cohort study was conducted, including 230 stroke patients who were admitted between January 2022 and January 2024. Nutritional status was assessed using the MST, with key outcomes including LOS, Total Lymphocyte Count (TLC), Neutrophil-to-Lymphocyte Ratio (NLR), serum albumin, Prognostic Nutritional Index (PNI), and mortality. Statistical analyses were performed using chi-square tests for categorical variables and t-tests or Mann-Whitney U tests for continuous variables, with a p-value of <0.05 considered statistically significant.

Result: The study found that 26.5% of patients had an MST score of 2 or higher, indicating a high risk of malnutrition. Patients with high MST scores had significantly lower TLC (p = 0.01), indicating a weakened immune response. No significant differences were observed in LOS (p = 0.63), mortality (p = 0.40), or other inflammatory markers such as NLR, albumin, and PNI between the high-risk and low-risk groups.

Conclusion: Malnutrition is common among stroke patients and is associated with impaired immune function, as evidenced by lower TLC in malnourished patients. Although no significant differences were observed in LOS or mortality, the findings underscore the importance of routine nutritional screening and timely intervention to improve patient outcomes.

KEYWORDS

Nutritional Support, Hospital Management, MST, Immune Function, TLC.

INTRODUCTION

Hospital malnutrition is a critical issue that frequently affects patients requiring extended care, particularly those with conditions like stroke[1,2]. Malnutrition in hospital settings is often caused by factors such as inadequate intake, increased metabolic demands, and complications from the primary illness[3,4]. Despite the known risks, malnutrition remains underrecognized, leading to poorer patient outcomes such as prolonged hospital stays, increased complications, and higher mortality[5,6,7].

Nutritional status plays a pivotal role in recovery, with malnourished patients being more susceptible to infections, delayed wound healing, and impaired immune function[8,9]. Inflammatory markers like the Neutrophil-to-Lymphocyte Ratio (NLR), serum albumin, and the Prognostic Nutritional Index (PNI) provide valuable insights into the patient's nutritional status, which directly impacts recovery. However, consistent screening using tools such as the Malnutrition Screening Tool (MST) is often overlooked, limiting opportunities for early nutritional intervention[10,11].

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This study assesses the prevalence of malnutrition among stroke patients and explores its impact on clinical outcomes, including length of stay, inflammatory markers, and mortality. By emphasizing the role of nutritional screening and timely intervention, this research seeks to highlight the importance of addressing hospital malnutrition to improve patient outcomes.

METHODS

Study Design and Participants

This study utilized a retrospective cohort design to assess the prevalence of malnutrition and its association with clinical outcomes in stroke patients. The study included patients diagnosed with stroke, admitted between January 2022 and January 2024. Inclusion criteria were patients aged 18 years and older, diagnosed with stroke, and hospitalized for at least seven days. Patients were excluded if they had incomplete medical records or were above the age of 59.

Nutritional Assessment

Malnutrition risk was evaluated using the Malnutrition Screening Tool (MST). Patients with an MST score of 2 or higher were considered at risk of malnutrition. Key laboratory parameters, including the Neutrophil-to-Lymphocyte Ratio (NLR), serum albumin levels, Total Lymphocyte Count (TLC), and Prognostic Nutritional Index (PNI), were also recorded and analyzed in relation to malnutrition status.

Data Collection

Data on patient demographics, nutritional status, inflammatory markers, length of stay, and mortality were collected from the medical records of Wahidin Sudirohusodo Hospital. The primary outcomes measured were LOS, inflammatory response (NLR, TLC, PNI, and albumin), and mortality. Data were analyzed to determine the correlation between malnutrition risk and these outcomes.

Statistical Analysis

Descriptive statistics were used to summarize patient characteristics. Categorical variables were analyzed using chi-square tests, while continuous variables were analyzed using t-tests or Mann-Whitney U tests, depending on the distribution of the data. A p-value of <0.05 was considered statistically significant.

RESULTS

Out of the 606 stroke patients initially identified during the study period, 130 patients were excluded due to not meeting the inclusion criteria: 93 were older than 59 years, and 37 had a length of hospital stay of less than seven days. This left a total of 476 patients for further analysis. After excluding 246 patients with incomplete data, 230 patients were included in the final analysis.

The median age of the patients was 51.5 years (IQR: 42-56), with a majority being male (57.4%). The median body mass index (BMI) was 21.5 kg/m² (IQR: 19.7-23.4 kg/m²). Regarding malnutrition risk, 26.5% of patients had an MST score of 2 or higher, indicating high risk, while 73.5% had a score below 2. The most common stroke type was infarction (65.2%), and hypertension was the most frequent comorbidity (20.9%).

Table 1. Baseline characteristics of the study patients

Age, year	51.5 [42, 56]
Sex	
Men	132 (57.4)
Woman	98 (42.6)
Height, cm	160 [155, 165]
Weight, kg	55 [49, 61.1]
BMI, kg/m2	21.5 [19.7, 23,4]
Education Status	
No Education	9 (3.9)
Elementary	49 (21.3)
Secondary	25 (10.9)
High School	102 (44.3)
Diploma	6 (2.6)
Bachelor	39 (17)
Occupation Status	
Unemployed	88 (38.3)
Student	4 (1.7)
Employee	56 (24.3)
Self-Employee	82 (35.7)
Marital Status	
Unmarried	25 (10.9)
Married	194 (84.3)
Widowed	11 (4.8)
MST	
<2	169 (73.5)
≥2	61 (26.5)

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 Indeks.

Table 1 continuation. Baseline characteristics of the study patients

Type of Stroke	
Infarction	150 (65.2)
Hemorrhagic	80 (34.8)
Intervention	
No	196 (85.2)
Yes	34 (14.8)
Comorbid	
No Comorbid	156 (67.8)
HT	48 (20.9)
DM	9 (3.9)
HT+ DM	13 (5.7)
CVD	4 (1.7)

MNT	
No	145 (63.0)
Yes	85 (37.0)
LOS	14 [10.7, 22.2]
Mortality	
No	34 (14.8)
Yes	196 (85.2)
NLR	6.3 [3.5, 9.8]
Albumin	3.5 [3.1, 3.9]
TLC	1587 [1055, 2313]
PNI	42.3 [37.4, 48.8]

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 Indeks.

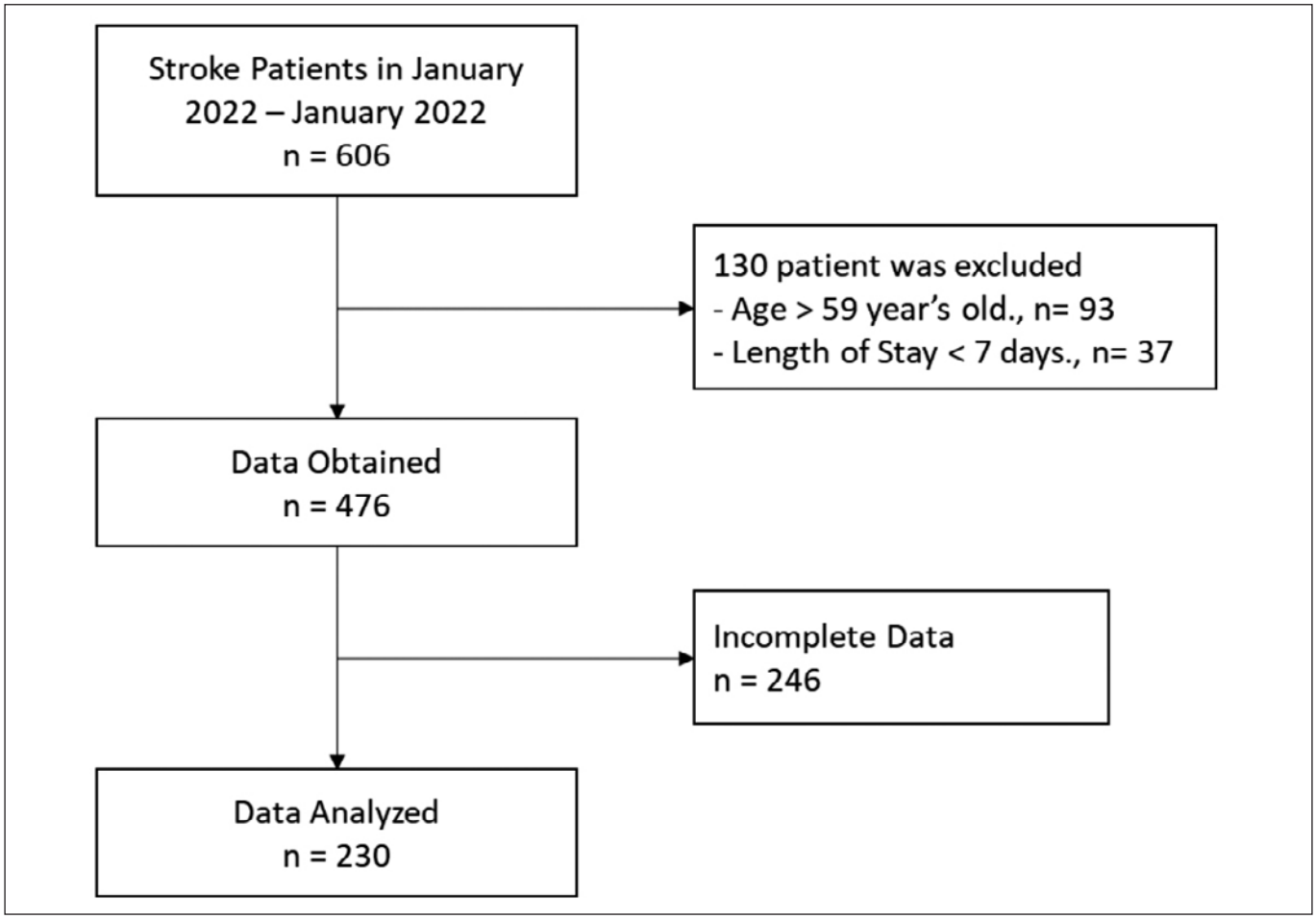

Figure 1. Flowchart for the selection of patients selected for the evaluation of Stroke

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

	MST<2 (n=169)	MST ≥2 (n=61)	p Value
Type of Stroke			
Infarction	102 (60.4)	48 (78.7)	0.01
Hemorrhage	67 (39.6)	13 (21.3)	
MNT			
No	110 (65.1)	35 (57.4)	0.285
Yes	59 (34.9)	26 (42.6)	
LOS	15 [11.25, 22.75]	13 [8, 21.5]	0.63
Mortality			
No	146 (86.4)	50 (82.0)	0.404
Yes	23 (13.6)	11 (18.0)	
NLR	6.38 [3.79, 9.5]	6.15 [3.42, 10,75]	0.283
Albumin	3.6 [3.2, 3.9]	3.4 [2.8, 3.8]	0.107
TLC	1759 [1247, 2342]	1248[666, 2174]	0.017
PNI	43.6 [38.9, 49.6]	41.4 [33.4, 47.1]	0.132

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 Indeks.

The average length of stay was 14 days (IQR: 10.7-22.2), and the mortality rate was 14.8%. Regarding nutritional status, patients with an MST score of 2 or higher had a lower Total Lymphocyte Count (TLC) compared to those with MST < 2 (1248 vs. 1759, p = 0.01), indicating a weakened immune response in the malnourished group. However, table 2 shows no correlations significant were found in the Neutrophil-to-Lymphocyte Ratio (NLR), albumin, and PNI between the two groups. Furthermore, there were no significant differences in length of stay (p = 0.63) or mortality (p = 0.40) between patients with high and low MST scores.

DISCUSSION

This study highlights the significant prevalence of hospital-acquired malnutrition among stroke patients, with over a quarter of the study population being at high nutritional risk based on the Malnutrition Screening Tool (MST). This finding aligns with prior research, which has consistently reported malnutrition as a common issue in stroke patients due to factors such as dysphagia, reduced intake, and increased metabolic demands[8,12]. The high prevalence of malnutrition underscores the importance of routine nutritional screening in this vulnerable population[4,10].

One of the key findings of this study is the association between malnutrition risk and immune function, as reflected by the significantly lower Total Lymphocyte Count (TLC) in patients with an MST score of 2 or higher. This suggests that patients at higher nutritional risk have compromised immune systems, making them more vulnerable to infections and other complications. Previous studies have similarly shown that malnutrition impairs immune function by reducing lymphocyte production and activity, which increases susceptibility to infections and delays recovery[13,14]. The lower TLC in malnourished patients emphasizes the need for early nutritional intervention to support immune function and potentially reduce the risk of infections in stroke patients[15,16].

Interestingly, this study did not find significant differences in key outcomes such as length of stay (LOS) and mortality between patients with high and low MST scores. This contrasts with previous literature, which typically shows that malnourished patients have longer hospital stays and higher mortality rates[2,5,17,18]. Several factors may account for this discrepancy. First, the clinical condition of stroke patients can vary widely, and the severity of stroke, rather than nutritional status alone, may have a more substantial impact on LOS and mortality. Additionally, the provision of medical nutrition ther-

apy (MNT) to patients identified as malnourished could have mitigated the adverse effects of malnutrition, helping to stabilize these outcomes[9]. In this study, 37% of patients received MNT, which likely contributed to more favorable clinical outcomes in the malnourished group.

Another important observation in this study is the higher prevalence of infarction stroke among malnourished patients compared to hemorrhagic stroke. Patients with an MST score of 2 or higher were more likely to have experienced an infarction stroke, whereas hemorrhagic stroke was more common in patients with an MST score below 2. While the reasons for this association are not entirely clear, it is possible that infarction stroke patients face unique nutritional challenges due to the nature of their condition, including prolonged immobility, which can exacerbate nutritional deficits[18,19]. Further research is needed to explore the mechanisms behind this association and to determine whether specific interventions could better address the nutritional needs of infarction stroke patients.

The study's strengths lie in its focus on a well-defined stroke population and the use of validated screening tools such as the MST and laboratory markers like TLC, NLR, albumin, and PNI. However, there are some limitations. First, the retrospective nature of the study limits the ability to establish causality between malnutrition and clinical outcomes. Additionally, the relatively small sample size may have reduced the study's power to detect significant differences in outcomes such as LOS and mortality. Larger, prospective studies are needed to confirm these findings and further explore the impact of nutritional interventions on clinical outcomes.

CONCLUSION

In conclusion, this study underscores the high prevalence of hospital malnutrition among stroke patients and its association with weakened immune function. While no significant differences in length of stay or mortality were found, the findings highlight the importance of early nutritional screening and intervention in this population. Addressing malnutrition through timely and targeted nutritional therapy may improve immune function and reduce the risk of complications, ultimately contributing to better outcomes for stroke patients.

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