Archives of Clinical and Experimental Surgery, 2024
VOL 13, NO. 03, PAGE 01-12

RESEARCH ARTICLE

Open Access

Prevalence and Associated Factors of Malnutrition Among Patients Undergoing Surgery at Saint Peter Hospital, Addis Ababa, Ethiopia, 2023

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ABSTRACT

Background: Malnutrition is an imbalance between food intake and needs. It is a clinical condition with multifactorial etiology, resulting in several disorders like immune suppression, increased susceptibility to infections, increased drug intolerance, and death.

Objective: To assess the prevalence and associated factors of malnutrition among patients undergoing surgery at Saint Peter Hospital, Addis Ababa, Ethiopia, 2023.

Methods: An institution based cross-sectional study was designed to investigate the prevalence and associated factors of malnutrition among adult patients undergoing surgery.

Results: During the preoperative period, the study found that 12.5% of patients were undernourished, while 30% were overnourished. Following surgery, the prevalence of undernutrition decreased to 10%, while overnutrition remained high at 29.2%. Furthermore, a statistically significant difference in hospital length of stay was observed between patients with normal nutritional status and those with undernutrition postoperatively. The mean difference between these groups was 2.65812 (95% CI=-3.07882 to -2.23742), with a p-value of less than 0.001. Specifically, patients with normal nutritional status had an average stay of less than 2.66 days longer than those with undernutrition.

ARTICLE HISTORY
Received: 11-Apr-2024, Manuscript No. EJMACES-24-132114;
Editor assigned: 15-Apr-2024, PreQC No. EJMACES-24-132114 (PQ);
Reviewed: 30-Apr-2024, QC No. EJMACES-24-132114;
Revised: 07-May-2024, Manuscript No. EJMACES-24-132114 (R);
Published: 14-May-2024

Keywords
Malnutrition; Nutritional status; Surgical patients; Surgical stress; Nutrition; Surgery

Introduction

Malnutrition is an imbalance between food intake and needs. It is a clinical condition of multifactorial etiologies, resulting in several disorders like immune suppression, increased susceptibility to infections, increased drug intolerance, and death [1]. Hospital malnutrition is a highly prevalent yet frequently under-recognized and under-treated condition [2]. Nutritional status is a significant determinant of postoperative outcomes [3]. However, Malnutrition is observed in up to 60% of surgical patients on admission to the hospital and has significant implications for their prognosis [4,5]. It has also been associated with a slower rate of wound healing and a higher rate of complications [6].

Several factors can predispose a patient to malnutrition during hospital stay, one of which is surgery. Surgery is a severe stressor in humans, triggering various inflammatory and catabolic processes [7]. Surgical stress produces muscle breakdown and lipolysis, which enhances the host's tolerance to microorganisms and speeds wound healing. Malnourished patients have an insufficient amount of muscle and body fat. As a result, they may not be able to cope with postoperative stress effectively [8].

Hypercatabolic, fasting periods, ileus, fistula, malabsorption syndrome, intestinal blockage, and gastric atony can all cause malnutrition in postoperative patients. Surgical patients who are severely unwell, elderly, or undergoing gastrointestinal surgery are at the highest risk of malnutrition [9]. An appropriate nutritional status allows the body to react properly to this stressor and recover faster and more efficiently. The role of postoperative nutrition support is to maintain nutritional status and energy requirements in the catabolic period after surgery [10].

Magnitude of malnutrition among surgical patients

Surgical patients may present with varying degrees of malnutrition, sarcopenia, cachexia, obesity, and Myosteatosis. Preoperative optimization can help improve outcomes. Perioperative fluid therapy should aim to keep the patient's fluid and electrolyte balance as close to zero as possible. A study conducted by using the Subjective Global Assessment

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(SGA) in German showed that hospital malnutrition is 27.4% in malnourished patients with a huge degree of variability between specialties. In patients who had undergone major abdominal surgery, the prevalence of malnutrition was 44%, with the lowest rates in those undergoing chest or general surgery (20% and 14%, respectively) [11,12]. Nutritional assessment parameters, such as Subjective Global Assessment, Malnutrition Universal Screening Test, Malnutrition Screening Test, Body Mass Index, and plasma protein levels (albumin), and delayed hypersensitivity response are mostly used in nutritional assessment, have prognostic value in the evaluation of hospitalized patients and are also mostly used in different study setups [13].

Likewise, a prospective cohort study conducted at Tikur Anbessa Specialized Hospital in Ethiopia assessed the magnitude of hospital malnutrition at the time of admission and evaluated its effect on the length of hospital stay among adult patients. The study indicated that 62.1% were malnourished according to Subjective Global Assessment (SGA) [14].

Also multi-center survey on hospital malnutrition, a cross-sectional study design that was conducted in 20 university hospitals across Iran indicated the highest prevalence of malnutrition in burns patients (77.70%) and heart surgery (57.84%) patients [15]. A retrospective review in East Carolina on malnutrition and its impact showed that the prevalence of patients undergoing major abdominal surgery 19% of the population was diagnosed as moderately or severely malnourished. The median length of hospital stay was 6 (a range of 1-98 days) [16].

A prospective study on 694 surgical patients treated in the ICU (Intensive Care Unit) in Tirana report shows the prevalence of malnutrition in gastrointestinal surgical patients (65.3%) and gastrointestinal cancer patients (84.9%) admitted to the intensive care [17].

A systematic review of Hospital malnutrition in Latin America showed that the prevalence of malnutrition was 40%-60% at the time of admission, with several studies reporting an increase in prevalence with increasing duration of hospitalization [18] (Table 1).

Table 1. Summary of prevalence of malnutrition among surgical patients.

Author/reference	Study area	Study design	Year of publication	prevalence
1	Cameroon	Cross sectional	2017	39.10%
6	Ethiopia	Cross sectional	2020	24.90%
9	Asian countries	systematic review	2020	2%-94%
12	German	Systematic review	2020	27.40%
14	Ethiopia	prospective cohort	2021	62.10%
15	Iran	cross-sectional study	2021	57.84%
16	East Carolina	retrospective review	2016	19%
17	Tirana	Prospective cohort study	2014	84.90%
18	Latin America	retrospective review	2017	40%-60%

Impact of nutritional status for surgical outcome

The human body requires Adenosine Tri-Phosphate (ATP) for life's functions. A complex chemical reaction combining carbohydrates, lipids, and proteins produces ATP in cells (amino acids). Since humans do not obtain their nutrition directly from the external environment on a regular basis, they rely on consuming nutrients stored within their bodies during periods of fasting or not eating. Thus, patients may survive even severe surgical insults without any nutritional therapy if they are well nourished and no severe complications occur. However, surgical stress activates host responses which directly act on hostile microbial invasion, accelerating wound healing and providing energy and amino acids to vital organs. Otherwise, patients could not survive these insults. The human body provides energy and materials for the enhanced host response by breaking down muscle protein in addition to fat. If external nutrition provision is inadequate or absent, patients instantly lose large amounts of muscle, delaying restoration of daily activities and/or increasing the risk of surgical complications [8].

In another study more than half of the patients (54%) had a nutritionally impaired condition (malnutrition in 10 percent and risk of malnutrition in 44 percent of patients, respectively). After the 3rd and 6th day of surgery, all patients were found to have high systemic problems. Patients who were well-nourished and at risk of malnutrition experienced fewer issues on the third post-surgery follow-up day whereas, Patients who were already malnourished experienced worse prognosis after the 6th day of surgery [7]. A systematic literature review of inpatient malnutrition in 11 Asian countries showed that malnutrition was connected to an increase in clinical complications, mortality, and Hospital length of stay, hospital readmissions, and healthcare expenses [9]. An interruption of nutritional intake is frequently observed after surgery; although it is evident that early oral and/or enteral food intake is possible, diminishes the risk of infectious complications and favors shorter hospital stays [19].

Nutrition counseling is the first choice, with or without Oral Nutritional Supplements (ONS). Even if more research is needed, a study suggests that increasing fatty acid and protein intake has a higher beneficial effect on treatment tolerance and efficacy that vitamins and minerals should be obtained in doses that are close to the recommended dietary allowances, and that higher doses should be avoided [20-22].

A prospective cohort study conducted on hospital malnutrition at the time of admission and its effect on hospital length of stay among adult patients at Tikur Anbessa Specialized Hospital in Ethiopia showed that the mean Standard Deviation (SD) length of hospital stays for all admitted patients was 13.84 days, with a significant difference ($p<0.01$) between malnourished patients and well-nourished patients. Malnourished patients had significantly longer hospital stays (17.2 ± 6.8 days) than well-nourished patients (8.3 ± 4.9 days) during 30 days of observations [14]. Similarly, a retrospective study with 1183 participants having hip arthroplasty surgery on patients greater than 65 years of age indicates that, the median preoperative LOS (Length of Stay) in the PEM (Protein Energy Malnutrition) group was higher at 7 (1-36) days than at 1 (1-22) day in the non-PEM group (p 0.001) [23].

A prospective observational cohort study of children at a tertiary surgical hospital in Harare, Zimbabwe to assess the effect of nutritional status in post-operative complication showed that seven times higher risk of postoperative complications among undernourished children (OR 7.3 (2.3-22.8), p=0.001) [24]. A cross-sectional study to assess malnutrition association with poor health-related quality of life in surgical patients with gastrointestinal cancer showed that, Malnutrition was associated with poor Health Related Quality of Life (HRQoL), thus patients with severe weight loss had worsen functional, symptom, global health and quality of life scores ($p<0.05$) [25].

A cross-sectional analytic study done at Yaounde Central Hospital in Cameroon reported that from a total of 85 patients, the Mean postoperative weight loss was 2.9 ± 1.2 kg, and the mean decrease in postoperative serum albumin was 4.2 ± 0.2 g. Normal postoperative serum albumin was associated with a favorable outcome (OR (Operating Room) (95% CI (Confidence Interval)=55(13.4-224.3), $p<0.001$). Another prospective study found that an absolute increase of 10% in protein intake relative to requirements reduced the relative complication risk by 10% (odds ratio, 0.900; 95% CI, 0.83-0.97; P.05) and also shortened the LOS by 0.23 days (95% CI, -0.3 to -0.2; P.05) [26].

Malnourished patients' (34% of surveyed patients) hospital stays were 18% (p=0.014) longer on average than well-nourished patients. Costs were, on average, between 31% and 34% (p-values 0.05) higher than for well-nourished patients with similar characteristics. Severely malnourished patients (11% of surveyed patients) stayed 34% (p=0.000) longer and had 38% (p=0.003) higher total costs than well-nourished patients [26,27].

Additionally, a study result showed that surgery is strongly associated with malnourishment and has a negative relation with postoperative outcomes. In an eight-week observational study on 460 patients, 52% of them having emergency surgery and 38% being a candidate for elective surgery, respectively, were at risk of malnutrition. These data were significantly

associated with a negative post-surgery outcome [28].

Materials and Methods

Study area and period

On the other hand, a cross-sectional study design was employed to analyse the prevalence and associated factors of malnutrition among patients undergoing surgery at St. Peter Specialized Hospital from May 1 to 30, 2023. The source population comprised all adults admitted to the surgical ward. Inclusion criteria encompassed adults (18 years or older) undergoing abdominal surgery, who provided informed consent. Exclusion criteria included patients unable to provide informed consent, those with known malnutrition or receiving nutritional support pre-surgery, and patients with a history of inflammatory bowel disease. Sample size determination utilized G power software for an independent t-test, with a 0.5 medium effect size, 80% power, and 0.05 significance alpha level, resulting in a final sample size of 120 participants, accounting for a 10% anticipated loss to follow-up. A consecutive sampling technique was employed to select study participants during the study period, meeting the inclusion criteria from the surgical ward of St. Peter Hospital upon admission for surgical intervention. Study variables comprised the dependent variable of nutritional status (normal, malnourished), and independent variables encompassing socio-demographic information, clinical variables, dietary assessment, biochemical tests, medical history, and hospital nutritional support/practice.

Data collection methods and data quality assurance

Data was gathered through a standardized, structured, and face-to-face interviewer questionnaire, along with direct measurements. The questionnaire comprised 33 questions divided into four parts. Part I focused on patient demographic variables (7 questions), Part II on patient clinical characteristics (12 questions), Part III on nutritional status of admitted patients (7 questions), and Part IV on clinical outcomes (5 questions). To ensure data quality, three Bachelor of Science holders received training and conducted daily supervision, spot checks, and review of completed questionnaires. After a pre-test, modifications were made as necessary. Duplicate measurements of weight, height, mid-upper arm circumference, and waist circumference were taken simultaneously from each study subject using calibrated and standardized equipment, with the average value recorded. Statistical analysis was performed using SPSS version 20 software. The association between nutritional status and surgical outcomes was expressed as odds ratios with 95 percent confidence intervals. Linear regression was utilized to establish the relationship between weight loss and length of hospitalization, with the correlation coefficient "r" indicating this relationship. A p-value of less than 0.05 was considered statistically significant.

Results

Socio demographic data

The average age of the participants was 43 years, with a standard deviation of ± 17, indicating variability within the sample. Participant ages ranged from 18 to 98 years, demonstrating a diverse age distribution. Most participants, comprising 94 individuals (78.3%), resided in Addis Ababa. Females constituted the predominant gender, representing 84 participants (70%) of the total sample. In terms of educational attainment, 44 participants (36.7%) had completed secondary or high school education. Marital status analysis revealed that most participants, accounting for 89 individuals (74.2%), were married. Regarding household composition, a significant proportion of participants, numbering 45 individuals (37.5%), reported having three to four members in their households. Occupation-wise, the majority, encompassing 65 participants (54.2%), identified as housewives. In terms of income, a substantial majority of participants, totaling 84 individuals (70%), reported monthly earnings falling within the range of 1500 to 5000 Ethiopian Birr (ETB) (Table 2).

Table 2. Socio demographic data.

Variables	Categories	Frequency	Percentage (%)
Mean age	43 ± 17 min (18) Max (98)		
place of residency	Addis Ababa	94	78.3
	Outside Addis Ababa	26	21.7
Sex	Male	36	30
	Female	84	70

Educational level	Cannot read and write	16	13.3
	Primary school	43	35.8
	Secondary/ High school	44	36.7
	Collage degree and above	17	14.2
Marital status	Single	30	25
	Married	89	74.2
	Divorced	1	0.8
Family size	<Two	12	10.9
	Three and four	61	50.8
	Five and above	46	38.3
Monthly income	<1500	6	5
	1500-5000	84	70
	>5000	30	25

Nutritional assessment at admission

Upon admission, the nutritional status of 145 patients, ranging from 18 to 98 years old and undergoing elective and emergency surgery, was evaluated. However, only 120 patients underwent reassessment. Anthropometric techniques, including weight, height, and mid-upper arm circumference, were primarily used to measure the nutritional status of the study participants. Upon admission, normal nutritional status was more prevalent, with 68 patients (56.7%), compared to undernutrition and overnutrition, which were observed in 15 patients (12.5%) and 36 patients (30%), respectively. Majority of the participants had a mid-upper arm circumference within the normal range (>21 cm) upon admission, accounting for 102 patients (85%). It is noteworthy that not all surgical patients who were admitted received nutritional assessments throughout the study period (Table 3).

Clinical feature of admitted surgical patients

Most study participants, comprising 108 individuals (90%), had no prior history of surgery. Additionally, 102 participants (85%) underwent elective surgery. A significant portion of patients, totalling 106 (88.3%), had no co-morbidities or previous surgical interventions. Furthermore, 90 participants (75%) reported experiencing the condition for longer than two weeks. Among the study population, 70 individuals (58.3%) were diagnosed with digestive system diseases (Table 4).

After surgery, the nutritional status of 120 participants was reassessed. It was observed that normal nutritional status was more prevalent than malnutrition, with 72 participants (60%) exhibiting normal nutritional status. Upon discharge or post-surgery, normal nutritional status remained predominant, with 72 participants (60%) compared to 12 participants (10%) classified as undernourished and 35 participants (29.2%) classified as overnourished. Notably, not all surgical patients who were admitted received nutritional assessments throughout the study (Table 5).

Nutritional status and surgical patient's outcome

In the postoperative evaluation, the length of hospital stay was calculated from admission to discharge. The average length of stay for the study participants was 4.2 days. Upon discharge, the condition of 116 participants (96.7%) showed improvement, while two patients were referred out. Data for the remaining two participants were missing (Table 6).

Effect of nutritional status on hospital length of stay

The paired samples t-test findings indicate a statistically significant difference between post-surgical nutritional statuses (normal and undernutrition) in terms of hospital length of stay. The mean difference between the two categories is -2.65812 (95% CI=-3.07882 to -2.23742), with a p-value of less than 0.001. Specifically, patients with normal nutritional status have an average shorter stay of less than 2.66 days compared to undernourished patients (Table 7).

Logistic regression analysis and interpretation

Both bivariate and multivariate logistic regression analyses were conducted, with a p-value of <0.25 applied as the cutoff point from bivariate to multivariate analysis. The multivariate analysis aimed to investigate the relationship between several independent variables and the dependent variable (nutritional status) among surgical patients.

Variables including place of residency, educational level, marital status, family size, monthly income, occupation, previous surgical history, diagnosis, category of surgery, co-morbidity, and duration of disease were considered suitable for inclusion in the multivariable binary logistic regression.

The results revealed that only one variable, sex, showed a statistically significant association with the outcome variable of nutritional status (Adjusted Odds Ratio (AOR)=0.26, 95% CI (0.09, 0.7), p=0.005). Conversely, none of the other variables (place of residency, educational level, marital status, family size, monthly income, occupation, previous surgical history, diagnosis, category of surgery, co-morbidity, and duration of disease) were found to be significantly associated with nutritional status (Table 8).

Table 3. Nutritional status of 145 patients.

Variables	Categories	Frequency	Percentage (%)
BMI (Body Mass Index)	<18.5	15	12.5
	18.5-25	68	56.7
	>25	36	30
	Missed	1	0.8
MUAC (Mid-Upper Arm Circumference)	<18	1	0.8
	18-21	17	14.2
	>21	102	85
Unplanned weight loss for the past six month	Yes	9	2.5
	No	111	92.5
Nutritional assessment practice done for the patients at ward	Yes	0	0
	No	120	100
Did they get nutritional advice given	Yes	3	2.5
	No	117	97.5

Table 4. Clinical feature of admitted surgical patients.

Variables	Categories	Frequency	Percentage (%)
Previous surgical History	Yes No	12 108	10 90
Diagnosis	Disease of the GI system goiter related disorder prostate related disorder breast related disorder other types of disease	70 24 6 2 1	58.3 20 5 1.7 1
category of surgery	Elective emergency	102 18	85 15
Co-morbidity	Yes No Missed	10 106 4	8.3 88.3 3.3

surgery cancellation for this episode	Yes No Missed	0 116 4	0 96.7 3.3
Duration of disease	<2 Weeks >2 Weeks	30 90	25 75

Table 5. Nutritional status of 120 patients.

Variables	Categories	Frequency	Percentage (%)
BMI (Body Mass Index)	<18.5	12	10
	18.5-25	72	60
	>25	35	29.2
	Missed	1	0.8
MUAC ((Mid-Upper Arm Circumference))	<18	0	0
	18-21	14	11.7
	>21	106	88.3
Unplanned weight loss for the past six month	Yes	9	2.5
	No	111	92.5
Nutritional assessment practice done for the patients at ward	Yes	0	0
	No	120	100
Did they get nutritional advice given	Yes	3	2.5
	No	117	97.5

Table 6. Nutritional status and surgical patient's outcome.

Variables	Categories	Frequency	Percentage (%)
Average Length of stay	4.25 days (± 2.24)		
Patient condition at discharge	Improved	116	96.7
	Referral out	2	1.7
	Missed data	2	1.7

Table 7. T test table of nutritional status on hospital length of stay.

Variables	Mean	SD	SE (Standard error) of mean	95% CI of the difference		t	df	Sig. (2 tailed)
		(Standard deviation)		Lower	Upper			
Nutritional status - HLoS	-2.65	2.29	0.212	-3.07	-2.23	-12.5	119	0.000

Table 8. Factor associated with nutritional status among surgical patients.

Variables	Nutritional status of surgical patients		P-value	COR (Crude Odds Ratio)	AOR (Adjusted Odds Ratio)
	Malnutrition	Normal			
Sex					
· Male	7 (5.8%)	29 (24.2%)		1	1
· Female	40 (33.3%)	44 (36.7%)	0.005	0.26 (0.10, 0.67)	0.26 (0.09, 0.7)
Place of residency					
. Addis Ababa	36 (30%)	58 (48.3%)		1	1
· Outside Addis Ababa	11 (9.2%)	15 (12.5%)	0.71	0.84 (0.35, 2.04)	0.84 (0.35, 2.04)
Educational level					
· Cannot read and write	1 (0.8%)	15 (12.5%)	0.68	8.18 (0.85, 78)	8.18 (0.85, 78)
. Primary school	16 (13.3%)	27 (22.5%)	0.89	0.92 (0.2, 2.9)	0.92 (0.2, 2.9)
· Secondary/ High school	24 (20%)	20 (16.7%)	0.45	0.45 (0.14, 1.44)	0.45 (0.14, 1.44)
· Collage Degree and Above	6 (5%)	11 (9.2%)		1	1
Marital status					
· Single	9 (67.5%)	21 (17.5%)		1	1
· Married	37 (30.8%)	52 (43.3%)	0.26	0.60 (0.2, 1.46)	0.52 (0.19, 1.4)
· Divorced	1 (0.8)	1 (0.8%)	1	0	-
Family Size					
· <Two	5 (4.2%)	8 (6.7%)		1	1
· Three and Four	26 (21.7%)	35 (29.2%)	0.78	0.84 (0.24, 2.87)	0.84 (0.24, 2.87)
· Five and above	16 (13.7%)	30 (25%)	0.81	1.17 (0.33, 4.17)	1.17 (0.33, 4.17)
Monthly income					
· <1500	1 (0.8%)	5 (4.2%)		1	
· 1500-5000	35 (29.1%)	49 (40.8%)	0.28	0.28 (0.31, 2.5)	0.12 (0.01, 1.3)
· >5000	11 (9.2%)	19 (15.8%)	0.35	0.34 (0.36, 3.35)	0.11 (0.01, 1.31)

Occupation							
· Employee	4 (3.3%)	6 (5%)			1	1	
· Self-Employee	4 (3.3%)	15 (12.5%)		0.82	2.5 (0.46, 13.39)	2.5 (0.46, 13.39)	
· Housewife	31 (25.8%)	34 (28.3%)		0.65	0.73 (0.18, 2.83)	0.73 (0.18, 2.83)	
· Other	8 (6.7%)	18 (15%)		0.6	1.5 (0.33, 6.82)	1.5 (0.33, 6.82)	
Previous surgical History							
· Yes	7 (5.8%)	5 (4.2%)			1		1
· No	40 (33.3%)	68 (56.7%)		0.54	0.64 (0.15, 2.62)		0.64 (0.15, 2.6)
Diagnosis							
· Disease of the GI system	26 (21.7%)	44 (36.7%)		0.32	1.69 (0.59, 4.8)		2.37 (0.74, 7.6)
· Goiter related Disorder	11 (9.2%)	13 (10.8%)		0.78	1.18 (0.34, 4.02)		1.28 (0.29, 5.5)
· Prostate related disorder	0 ()	6 (5%)		0.99	-		-
· Breast related disorder	1 (0.8%)	1 (0.8%)		0.62	1 (0.5, 18.57)		1.07 (0.49, 23)
· Other types of disease	9 (7.5%)	9 (7.5%)			1		1
category of surgery							
· Elective	39 (32.5%)	63 (52.5%)		0.69	1.29 (0.47, 3.55)		1.29 (0.47, 3.5)
· Emergency	8 (6.7%)	10 (8.3%)			1		1
Co-Morbidity							
· Yes	3 (2.5%)	7 (5.8%)			1		1
· No	44 (36.7%)	66 (55%)		0.54	0.64 (0.15, 2.62)		0.47 (0.06, 3.3)
Duration of disease							
· <2 Weeks	10 (8.3%)	20 (16.7%)		0.16	1		1
· >2 Weeks	37 (30.8%)	53 (44.2%)			2.38 (0.71,7.99)		1.11 (0.38, 3.2)

Discussion

Between January 30 and March 2023, a total of 120 study participants were enrolled. Anthropometric measurements, including BMI based on WHO classification, were primarily used to assess the nutritional status of patients both before and after surgery. Preoperatively, the prevalence of malnutrition was 12.5% for undernutrition and 30% for overnutrition. Postoperatively, the prevalence of malnutrition decreased slightly to 10% for undernutrition and 29.2% for overnutrition.

A study conducted in Germany utilized the Subjective Global Assessment (SGA) to evaluate hospital malnutrition, revealing an overall prevalence of 27.4% among malnourished patients. The prevalence varied significantly across different medical specialties, with the highest rates observed in patients undergoing major abdominal surgery (44%), followed by those undergoing chest surgery (20%) and general surgery (14%).

Likewise, a prospective cohort study conducted at Tikur Anbessa Specialized Hospital in Ethiopia found that 62.1% of adult patients were malnourished at the time of admission, according to the SGA. Another cross-sectional study conducted in Yaounde Central Hospital in Cameroon reported that the prevalence of preoperative malnutrition according to the Malnutrition Universal Screening Tool (MUST) score was 39.1% among a total of 85 patients. These findings suggest that malnutrition is a common problem among surgical patients, with varying prevalence rates depending on the population being studied and the assessment method used. It is important for healthcare providers to screen surgical patients for malnutrition and provide appropriate nutritional support to improve patient outcomes.

The study revealed a significant difference in hospital length of stay between patients with normal nutritional status and those with undernutrition during the postoperative period. The mean difference between the two groups was -2.65812 (95% CI=-3.07882 to -2.23742), with a p-value of less than 0.001. Patients with normal nutritional status stayed on average less than 2.66 days compared to undernourished patients. The negative sign of the mean difference indicates that surgically treated patients with normal nutritional status had a shorter hospital length of stay compared to undernourished patients. These findings suggest a potential association between nutritional status and hospital length of stay for surgical patients.

Similarly, a prospective cohort study conducted at Tikur Anbessa Specialized Hospital in Ethiopia examined the effect of hospital malnutrition on hospital length of stay among adult patients at the time of admission. The study found that the mean Standard Deviation (SD) length of hospital stay for all admitted patients was 13.84 days, with a significant difference ($p<0.01$) observed between malnourished and well-nourished patients. Malnourished patients had substantially longer hospital stays (17.2 ± 6.8 days) compared to well-nourished patients (8.3 ± 4.9 days) over a 30-day observation period [14]. A retrospective study with 1183 participants having hip arthroplasty surgery on patients greater than 65 years of age indicate that, the median preoperative LOS in the PEM group was higher at 7 (1-36) days than 1 (1-22) day in the non-PEM group (p 0.001) [23].

The variable "sex" was identified as significantly associated with nutritional status. The odds of experiencing malnutrition were notably lower among males (AOR=0.26, 95% CI 0.09-0.7, p=0.005) compared to females. While research specifically examining the relationship between sex and nutritional status among surgical patients is limited, studies in other populations have explored this association.

Although the findings from these studies indicate that the link between sex and nutritional status may differ based on the studied population and contextual factors, further investigation is warranted to fully understand this relationship within surgical patient populations.

Limitation and strength

The study's strength lies in its comprehensive longitudinal design, which tracks patients' nutritional status from admission to discharge, demonstrating a patient-centered approach and prioritizing outcomes. By analyzing changes in nutrition over time, the study yields major insights into intervention effectiveness, underscoring the importance of personalized care and bolstering patient well-being. However, limitations include its single-center setting, potentially constraining the generalizability of findings, as well as a relatively small sample size, which may have impacted statistical power. Additionally, the use of a cross-sectional study design poses constraints on establishing causal relationships between variables. Despite these limitations, the study's meticulous focus on initial anthropometric measures adds robustness to its findings, enriching the understanding of nutritional interventions and patient outcomes.

Conclusion

The study's findings underscore the significance of pre- and post-operative nutritional status in evaluating surgical outcomes. It highlights a notable relationship between post-surgical nutritional status and the duration of hospital stay, indicating the potential impact of nutritional support on patient recovery. Enhancing nutritional support for surgical patients emerges as

a important strategy to mitigate complications and expedite hospital discharge. These insights emphasize the importance of integrating comprehensive nutritional interventions into perioperative care protocols, aiming to optimize patient outcomes and streamline healthcare delivery. Continuous monitoring of patients' nutritional status throughout their hospital stay is imperative, with interventions adjusted as needed. Moreover, conducting further research to ascertain the most effective nutritional interventions for improving surgical outcomes and reducing malnutrition prevalence among surgical patients is essential. Additionally, healthcare providers should be trained on the significance of assessing and addressing nutritional status in surgical patients, ensuring comprehensive and patient-centered care delivery. These measures collectively aim to mitigate complications, expedite recovery, and ultimately enhance the overall quality of surgical care.

Declarations

Ethical approval

This research study was conducted in accordance with the ethical standards outlined in the Declaration of Helsinki. Approval for the study protocol was obtained from the Institutional Review Board (IRB) of Saint Peter Hospital. The proposal was approved with the version number (version V690/29/01/2023.The aim of the study was clearly explained to the study participants and their right to refuse was maintained. All participants provided informed consent before participating in the study. Information was collected after obtaining informed verbal and written consent from all participants. The personal information of study participants was kept entirely anonymous, and confidentiality was assured throughout the study period. The name and address of the patient was omitted from the questioner. The data was used only for the intended purpose of the study.

Consent to participate declaration

Not applicable

Consent for publication

Not relevant

Availability of data and materials

The corresponding author can provide the datasets used and analysed in this study upon reasonable request.

Competing interests

The writers claim to have no conflicting agendas.

Funding

No grant from a public, private, or non-profit organization was given for this research.

Authors' contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Acknowledgments

The authors express their gratitude to the staff and patients of Saint Peter Specialty Hospital, for their support during data collection. Their contributions were important to the success of the study.

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