



PREOPERATIVE NUTRITION STATUS AND POST OPERATIVE OUTCOME IN ELDERLY GENERAL SURGERY PATIENTS

^{1,*}Sana Tariq, ²Dr. Sumaira Otho, ³Muhammad Afzal and ⁴Dr Nadia Bhatti

¹Tabba kidney institute, Pakistan

²Assistant Professor of Surgery, FRPMC Karachi, Pakistan

³FCPS general surgery, Assistant prof., CKMC.Kharian, Pakistan

⁴Associate professor, General Suregry, CMC teaching hospital, Larkana, , Pakistan

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Abstract

Background: Malnutrition, a condition often underdiagnosed and undertreated in older adults, is associated with a spectrum of adverse effects, including impaired immunity, delayed wound healing, increased susceptibility to infections, and prolonged hospitalization. The main purpose of this study is to assess the effect of pre-operative nutritional status on general surgery outcomes of elderly patients in Pakistan. **Methods:** This is a prospective, cohort study conducted for the duration of 1. Patients aged between 45 – 70 years, both genders, enlisted for general surgery procedure under general anesthesia were requested to enroll in the study, the sample size was estimated at 72. Pre-operative nutritional assessment was evaluated with the help Subjective Global Assessment (SGA) and post-operative assessment was assessed as surgery outcomes morbidity & mortality. Statistical package for social sciences (SPSS) version 23 was used to enter, sort and analyze the data, chi-square test was used to assess significance between two variables keeping p-value of ≤ 0.05 as significant. Hazard ratio was used to assess risk of complication after surgery in malnourished patients. **Results:** Total 72 patients were enrolled in the study; According to SGA, 38 (52.7%) patients were well nourished and 34 (47.2%) patients were malnourished respectively. Morbidity was higher in malnourished patients with overall infection frequency of 7 (9.7%), wound infection was reported in 8 (11.1%), myocardial infarction in 2 (2.7%) and stroke in 1 (1.3%). Mortality was specifically higher in malnourished patients, in hospital mortality was reported in 5 (6.9%) and 30 days after surgery mortality was reported in 4 (5.5%) respectively. Hazard ratio test indicated higher risk of morbidity with HR 2.8 (1.04-3.99), mortality with HR 1.4 (0.81 - 2.24), hospital stay as 1.7 (1.13 - 3.24) and recovery time as 3.81 (1.92 - 5.11) respectively. **Conclusion:** This study concluded that to avoid post operative complications, prolong hospital stay and mortality proper nutritional assessment is necessary before surgeries for elderly patients, well nourished elderly patients reported less post-operative morbidity and mortality.

Keywords: Nutritional status, Elderly patients, General surgery, Mortality, Morbidity.

INTRODUCTION

Aging is an inevitable biological process characterized by a progressive decline in physiological function, increased vulnerability to disease, and reduced capacity to recover from physical stressors such as surgery. Among the countless factors influencing surgical outcomes in elderly patients, preoperative nutritional status has emerged as a critical determinant¹. Malnutrition, a condition often underdiagnosed and undertreated in older adults, is associated with a spectrum of adverse effects, including impaired immunity, delayed wound healing, increased susceptibility to infections, and prolonged hospitalization². These complications not only compromise clinical outcomes but also diminish the quality of life for elderly patients, many of whom are already navigating the challenges of multiple morbidities and functional compromise. The global demographic shift toward an aging population has brought the issue of malnutrition into sharp focus. According to the World Health Organization, the proportion of individuals aged 60 years and older is expected to double by 2050, reaching nearly 2.1 billion worldwide³. This demographic transition emphasizes the crucial need to address the nutritional needs of elderly patients, particularly those undergoing surgical interventions. Surgery, while often life-saving or life-improving, imposes significant physiological

stress on the body. In elderly patients, whose body reserves are often suboptimum, the ability to endure and recover from this stress is closely tied to their nutritional status. Malnutrition in the elderly is a multifactorial condition, influenced by a complex interaction of medical, social, and psychological factors. Chronic diseases such as diabetes, cardiovascular disease, and cancer can alter metabolic demands and nutrient absorption⁴. Multiple medication, common in older adults, may lead to drug-nutrient interactions or side effects such as anorexia and gastrointestinal disturbances. Social determinants of health, including poverty, social isolation, and limited access to nutritious food, further exacerbate the risk of malnutrition. Cognitive impairment and depression, prevalent in this population, can also contribute to reduced dietary intake and poor nutritional status⁵. The consequences of malnutrition in the context of surgery are profound. Preoperative malnutrition has been linked to increased rates of postoperative complications, including surgical site infections, pneumonia, sepsis, and anastomotic leaks⁶. It is also associated with higher rates of unplanned intensive care unit admissions, longer hospital stays, and increased mortality. Conversely, adequate preoperative nutrition has been shown to enhance immune function, promote tissue repair, and improve overall resilience, thereby reducing the risk of adverse outcomes. In this context, nutritional assessment and buildup prior to surgery are not merely supportive measures but essential components of perioperative care. General Surgery patients are profoundly exposed to larger wounds, gut anastomosis or resections with

*Corresponding Author: Sana Tariq,
Tabba kidney institute, Pakistan.

loss of body fluids in form of bile, stool or gastric contents, further declining the patients' albumin and anabolic reserves and loss of micronutrients, requiring continued supply in form of Total or Peripheral Parenteral Nutrition (TPN, PPN).⁷ Furthermore, oncological and emergent procedures also demand optimum nutritional status pre and post operatively for the patient to recover smoothly, with the challenge of not providing a good time window to adequately build the patient's reserves. Nutritional assessment in elderly surgical patients requires a comprehensive and multidimensional approach. Traditional markers such as body mass index (BMI) and serum albumin levels, while useful, may not fully capture the degrees of nutritional status in this population.⁸ The main purpose of this study is to assess the effect of pre-operative nutritional status on general surgery outcomes of elderly patients in Pakistan.

METHODOLOGY

This is a prospective, cohort study conducted at Mominabad General hospital, Karachi, for the duration of 1 year starting from 10th, February 2024 till 16th, February 2025. Patients aged between 45 – 70 years, both genders, enlisted for general surgery procedure under general anesthesia were requested to enroll in the study by signing an informed consent in the language of understanding. The sample size was estimated at 72, keeping margin of error as 5%, confidence interval as 95% and 50% prevalence of malnutrition in elderly general surgery patients. The estimation was taken from previous studies conducted on Pakistani population indicating 50% of elderly population suffers from malnutrition. Patients undergoing emergency surgery, oncology patients, biopsy patients and patients diagnosed with severe mental illness were excluded from the study. Pre-operative nutritional assessment was evaluated with the help of multimodal approach, Body mass index (BMI) was calculated, serum albumin levels were recorded, medical history and physical assessment was documented, and Subjective Global Assessment (SGA) was used to assess nutritional levels. Post-operative assessment was assessed as surgery outcomes, age, gender, comorbidities, operative duration, requirement of blood transfusion, morbidity (infection, myocardial infarction, stroke), mortality (within 30-days of surgery), duration of hospital stay, recovery metrics (time to return to baseline functional state) were monitored. Statistical package for social sciences (SPSS) version 23 was used to enter, sort and analyze the data. Normality of data was evaluated with the help of Shapiro Wilk test, continuous variables were analyzed as mean and standard deviation, categorical variables were analyzed as frequency and percentages, and chi-square test was used to assess significance between two variables keeping p-value of ≤ 0.05 as significant. Hazard ratio was used to assess risk of complication after surgery in malnourished patients.

RESULTS

Total 72 patients were enrolled in the study; with 39 (54.1%) male patients while 33 (45.8%) female patients. Age was categorized as 45-55, 56-65 and 66-75 years with frequency of 19 (26.3%), 24 (33.3%) and 29 (40.2%) respectively. Marital status was reported as married in 46 (63.8%), widows in 19 (26.3%) and divorced in 7 (9.7%) respectively. Hypertension and Diabetes mellitus combined were most frequently reported comorbidity with frequency of 31(43%) followed by Cardiovascular disorders 25 (34.7%) Table 1. Basal metabolic

syndrome (BMI) and Subjective Global Assessment (SGA) categories were reported in study participants as obese in 7 (9.7%), overweight in 11 (15.2%) and normal in 26 (36.1%) patients, underweight patients were 28 (38.8%).

Table 1. Demographic details of study participants

Variables (n=72)		Frequency	%
Gender	Male	39	54.1
	Female	33	45.8
Age categories	45 – 55	19	26.3
	56 – 65	24	33.3
	66 – 75	29	40.2
Marital status	Married	46	63.8
	Widow	19	26.3
	Divorced	7	9.7
Comorbidities	Hypertension	9	12.5
	Diabetes Mellitus	7	9.7
	HTN + DM	31	43
	CVD	25	34.7

According to SGA, 38 (52.7%) patients were well nourished and 34 (47.2%) patients were malnourished respectively. Figure 1

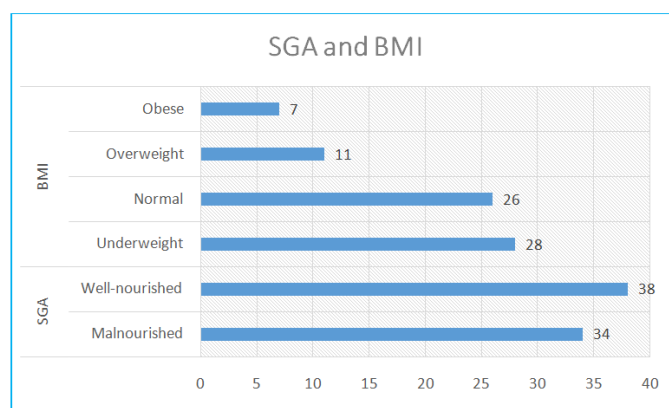


Figure 1. Categorization of BMI and SGA

Morbidity was higher in malnourished patients with overall infection frequency of 7 (9.7%), wound infection was reported in 8 (11.1%), myocardial infarction in 2 (2.7%) and stroke in 1 (1.3%). Mortality was specifically higher in malnourished patients, in hospital mortality was reported in 5 (6.9%) and 30 days after surgery mortality was reported in 4 (5.5%) respectively. Mean hospital stay was 2.6 ± 0.8 and 3.4 ± 1.1 while recovery time was 33.2 ± 2.8 and 41.5 ± 3.4 in well nourished and malnourished patients respectively. Pre operative mean albumin was reported as 3.3 ± 0.1 and 2.1 ± 0.4 while mean BMI was 26.4 ± 3.7 and 19.8 ± 2.1 in well nourished and malnourished patients respectively. Table 2

Table 2. Distribution of surgery complications and outcomes in well nourished and malnourished patients

Variables		Well nourished	Malnourished	P-Value
Morbidity	Infection	4 (5.5%)	7 (9.7%)	0.04
	Wound infection	2 (2.7%)	8 (11.1%)	0.002
	Myocardial infarction	1 (1.3%)	2 (2.7%)	0.06
	Stroke	0	1 (1.3%)	0.091
Mortality	In Hospital	2 (2.7%)	5 (6.9%)	0.03
	30-day after surgery	1 (1.3%)	4 (5.5%)	0.004
Hospital stay		2.6 ± 0.8	3.4 ± 1.1	0.07
Recovery time		33.2 ± 2.8	41.5 ± 3.4	0.0005
Albumin		3.3 ± 0.1	2.1 ± 0.4	0.03
BMI		26.4 ± 3.7	19.8 ± 2.1	0.02

Hazard ratio test indicated higher risk of morbidity with HR 2.8 (1.04-3.99), mortality with HR 1.4 (0.81 - 2.24), hospital stay as 1.7 (1.13 - 3.24) and recovery time as 3.81 (1.92 - 5.11) respectively. Table 03

Table 3. HR indication of malnourished patients

Variables	HR 95% CI	P-value
Morbidity	2.8 (1.04-3.99)	0.32
Mortality	1.4 (0.81 - 2.24)	0.48
Hospital stay	1.7 (1.13 - 3.24)	0.91
Recovery time	3.81 (1.92 - 5.11)	0.01

DISCUSSION

Our study established the strong correlation between malnutrition and post-operative morbidity and mortality in elderly surgical patients. Literature also suggests the same in regards with general surgical, oncological and allied surgical patients, all in all proving the fundamental role of a good nutritional status in an individual's post-operative recovery⁹⁻¹⁰. Our study also enhances the role of SGA score system to categorize the patients into well and malnourished categories and thereby making it an effective parameter to predict the mortality and morbidity, same has been established in literature worldwide.¹¹⁻¹³ A systematic review implicated the importance of PG-SGA and its superior efficacy in cancer patients this study conducted a systematic review and meta-analysis to evaluate the diagnostic accuracy of SGA, PG-SGA, and MUST for cancer-associated malnutrition. A total of 16 studies were investigated using a hierarchical bivariate model. Sensitivity and specificity were 0.69/0.80 for SGA, 0.95/0.81 for PG-SGA, and 0.83/0.83 for MUST. PG-SGA had the best diagnostic performance, with the highest positive likelihood ratio and lowest negative likelihood ratio, making it the most effective tool for detecting malnutrition in adult cancer patients.¹⁴ but the need to use SGA in our patients is based on the fact that SGA is a scoring system for general patients and that it is clinician based and involves clinical and physical assessments.

The implication of malnourishment has not only affected the morbidity in terms of post-operative infection, complications and prolonged hospital stay but has also affected the mortality rate with in hospital stay or within 30 days of discharge from the hospital. Hu WH et al establish the following fact in their study, out of over 42,000 patients of colorectal cancer in their data, the patients with low BMI of less than 18.5 kg/m² had a hazard ratio of about 1.7, our study shows a mean BMI of 19.8 with a hazard ratio of 1.4 in terms of mortality in malnourished patients according to SGA score.¹⁵ Another study depicting the higher mortality associated with malnourished SGA score was done by Oh SY but it was applied on gastrointestinal perforation patients which is although a surgical emergency but it encompasses variable age groups. The study showed that in-hospital mortality was significantly higher in those with pre-operative malnutrition as assessed by the composite index.¹⁶ Similarly, morbidity was also higher in malnourished patients in all the literature explored. Pre-operative malnutrition has objectively been calculated by hypoalbuminemia as well and that has also emerged as an independent prognostic factor. The study by Maurer E. et al explores the orthopedic surgery patients and prove again the link between all surgical specialties that is the common dogma of surgical site infections or SSI. This study proves that malnourished state itself is the independent risk factor of SSI and thereby enhancing the post

operative morbidity.¹⁷ Morbidity or the persistence of ailment in the post operative period is directly linked to any of the post operative complications. The Clavien Dindo classification grades the complications and any of them as simple as a fever requiring change of antibiotics to a post operative hemorrhage warranting re exploration. Any grade of complication can be a source of increasing morbidity. A prospective study by Weitzberg D.L evaluated 161 adult trauma patients admitted to different surgical and intensive care units at the Centro de Emergencias Médicas in Asunción, Paraguay, between 2002 and 2004. Using the Subjective Global Assessment (SGA) at admission, researchers assessed malnutrition and followed patients for hospital stay duration, complications, and mortality. The median age was 27 years, with 94% being male and 74% from rural areas. Malnutrition or risk of malnutrition was present in 40% of patients. Multivariate analysis revealed significant risk factors for mortality, including malnutrition ($p = 0.04$, $RR = 4$) and ICU admission ($p = 0.0001$, $RR = 53$). Complications were associated with malnutrition ($p = 0.003$, $RR = 2.9$) and ISS over 20 ($p = 0.001$, $RR = 8.4$). Longer hospital stays were linked to malnutrition ($p = 0.01$, $RR = 2.3$) and high ISS ($p = 0.03$, $RR = 2.8$), similar to our study¹⁸. Although we have gathered data from elderly general surgical patients but as previously mentioned the literature specific to elderly population in the last 10 years is quite limited, hence we have extended our scope of discussion to other population groups as well, reinforcing the importance of nutritional status on the post operative outcomes.

A study comprising of more than 76,000 patients with gynecological cancers, done by Goins et al, collected patients' details from the national database. This study explored the data from the National Surgical Quality Improvement Program (NSQIP) to assess the association between different malnutrition criteria and postoperative morbidity in patients undergoing surgery for ovarian, uterine, or cervical cancer between 2005 and 2019. Malnutrition was categorized based on BMI, weight loss, and albumin levels. Among 76,290 patients, malnutrition prevalence varied across descriptions, with albumin <3.5 g/dL being the most common (11.1%). Complications included unintended readmissions (5.5%), redo operations (1.7%), and major complications (13.5%). ESPEN2-defined malnutrition was linked to increased morbidity in ovarian cancer, ACS-defined malnutrition in uterine cancer, and low albumin in cervical cancer. Overall, albumin <3.5 g/dL was a predictor of hostile outcomes across all cancers. These findings suggested that preoperative risk assessment should consider cancer-specific malnutrition criteria to improve surgical outcomes.¹⁹

Similarly, a study of patients with hepatocellular carcinoma indicated the impact of preoperative malnutrition on postoperative outcomes in 287 HCC patients undergoing hepatic resection. Malnutrition (33.4%) was linked to higher comorbidities, dire complications, and prolonged hospital stays ($P < 0.001$). Major complications were significantly more frequent ($P < 0.01$). Age ≥ 70 years ($RR = 2.50$, $P = 0.008$) and PG-SGA score ≥ 4 ($RR = 9.85$, $P < 0.001$) were crucial risk factors.²⁰ The literature establishes an important ground for pre-operative nutritional assessment. Along with BMI, SGA and PG-SGA, newer advances are in the talks and development of Perioperative Nutrition Screening is making rounds and setting the ground for the importance of pre-operative nutritional assessment for patients undergoing elective surgeries.²¹

Conclusion

This study concluded that to avoid post operative complications, prolong hospital stay and mortality proper nutritional assessment is necessary before surgeries for elderly patients, well nourished elderly patients reported less post-operative morbidity and mortality.

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