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Original research article

Preoperative nutritional condition and postoperative wound healing in elective laparotomy patients

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Abstract

Background: Clinical outcomes in surgical patients may be affected by the patients' nutritional state, which in turn affects immune function, tissue repair, and the patients' overall health. The purpose of this research was to evaluate the nutritional status of patients having laparotomy and their recovery after surgery.

Material and Methods: This study was prospective and observational. The Department of General Surgery Sri Balaji Medical College Hospital & Research Institute, Renigunta, Tirupati Airport Road, Andhra Pradesh, India, patients who attended the outpatient clinic or were hospitalized as inpatients participated in the study. This research was carried out between April 2021 to April 2023. The sample size for this study was 20.

Results: Of the people who took part in the study, only 20% were considered to have optimal nutrition, while the remaining 80% ranged from mild to severe malnutrition. The median handgrip strength was lower on postoperative day 3 compared to preoperative day 1. The handgrip strength of healthy individuals was greater before and after surgery than that of malnourished patients. The hospital diet drastically under-supplied patients in terms of both total energy and protein. The median length of hospital stay and the incidence of surgical complications were both higher for severely malnourished patients. The number of problems and length of hospital stay were inversely associated to handgrip strength before and on day 3 after surgery.

Conclusion: Clinical outcomes were poor, especially for the most severely malnourished patients, suggesting a connection between the prevalence of malnutrition and the lack of proper nutritional care provided to these patients while in the hospital. In order to improve surgical patients' clinical outcomes after surgery, it is important to encourage proper nutritional assessment and the provision of adequate nutritional support.

Keywords: Clinical study, preoperative nutritional, postoperative wound healing, laparotomy

Introduction

Malnutrition is still a problem, and it's especially widespread among hospitalized people. Malnutrition affects anywhere from 19% to 59% of hospitalized adults worldwide, with the highest rates found in low- and middle-income nations [1, 2]. The effects of malnutrition on the recovery process are particularly relevant in the context of surgical patients. In 1936, Studley was the first to find a correlation between being underweight before surgery and having a higher mortality rate thereafter. Since then, a mountain of evidence has accumulated linking preoperative malnutrition to issues like infection, slow wound healing, and extended hospital stays. Clinical results following surgery are also improved when severe malnutrition is treated before surgery, according to multiple studies [3, 4]. Changes in body composition and reduced physiologic function can result from malnutrition, which can be caused by inadequate or excessive nutrition and may or may not be accompanied by inflammation. Many diseases, including HIV, organ failure, cancer, metabolic syndrome, and chronic mild inflammation, are present in patients who present for surgical evaluation and increase their risk of chronic disease-related malnutrition. Simple starvation-related malnutrition, which is defined as prolonged under nutrition in the absence of an inflammatory disease, may also lead to preoperative malnutrition [5, 6].

Acute disease-related malnutrition is more likely to occur following surgery in all patients, regardless of their nutritional state before the procedure. Metabolic stress [7, 8], mediated by inflammatory cytokines and catecholamines, is triggered by any physiologic damage. They all work together to boost metabolic rate and muscle proteolysis in proportion to the extent of the injury. When combined with postoperative

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dietary restrictions and reduced mobility, this can quickly lead to a loss of muscle and functional capacity. Thus, a patient who is either well-nourished or over-nourished might acquire severe acute disease-related malnutrition within as little as 10 days if they are not fed appropriately before or after major surgery. There are evidence-based guidelines available to direct perioperative nutritional care. The patient's nutritional state must be assessed prior to making any suggestions regarding preoperative nutrition therapy [9-14].

All patients should be assessed for their risk of malnutrition prior to surgery, and those at high risk should be further assessed by a nutritionist. Procedure should be delayed by 7-10 days to provide for proper nutritional assistance if the patient has been diagnosed with severe malnutrition and the procedure is not an emergency. Patients should be allowed to have solid meals up to 6 hours before surgery on the day of operation, as recommended by the European Society of Anesthesiology [15]. Up until 2 hours before surgery, patients are recommended to consume clear liquids, after which they should have nothing to eat or drink. Carbohydrate loading with a clear liquid beverage before undergoing gastrointestinal surgery is one component of the Enhanced Recovery after Surgery (ERAS) regimen, which has been found to significantly improve outcomes for patients. Most people are able to eat normally afterwards after surgery. Fasting or stomach decompression after surgery has not been shown to improve outcomes. Instead, the patient should transition to enteral feeding or a solid diet during the first 24 hours. After surgery, patients need more protein and calories to recover from the metabolic stress response. Protein needs should be satisfied within 7-10 days to reduce the risk of nutritional consequences [14-16].

The European Society for Enteral and Parenteral Nutrition recommends that all patients be fed orally as soon as feasible, ideally within 24 hours, or started on enteral tube feeding if they are not expected to eat orally within 7 days. When oral or enteral feeding does not seem viable in the next 3-7 days, parenteral nutrition should be commenced as soon as possible for a malnourished patient, or after 7 days for a well-nourished patient. The quality of nutrition care services provided to surgical patients relative to these best practices is not yet well understood. Hospitalized adults are understudied, and we know very little about their nutritional health. Therefore, the purpose of this prospective observational study was to evaluate the preoperative nutritional state of adult surgical patients having laparotomy at a tertiary referral hospital and to identify gaps in the provision of nutrition therapies. Patients undergoing surgery need a higher protein and calorie intake to counteract the catabolic effect of metabolic stress, so the hospital's food was tested for sufficiency. After surgery, researchers looked into how these variables played a role [17, 18].

Material and Methods

This study was prospective and observational. The Department of General Surgery Sri Balaji Medical College Hospital & Research Institute, Renigunta, Tirupati Airport Road, Andhra Pradesh, India, patients who attended the outpatient clinic or were hospitalized as inpatients participated in the study. This research was carried out between April 2021 to April 2023. The sample size for this study was 20.

Inclusion Criteria

- Patients filling consent form.
- Individuals who have malnutrition problem.
- Adults undergoing elective laparotomy.

Exclusion criteria

- Patients who refuse to take part in the trial.
- Patient who defaulted after receiving treatment.
- Women in pregnancy.

Nutrition assessment

Each patient's nutritional condition was evaluated using the Subjective Global Assessment (SGA), and they were categorized as having either severe malnutrition, mild/moderate malnutrition, or adequate nutrition. By combining data from a patient's medical history with a physical examination, the SGA can provide an accurate assessment of nutritional status and make accurate prognoses. For SGA, a clinician utilizes a scoring system that takes into account the patient's self-reported diet, weight changes, GI symptoms, functional capacity, metabolic stress level, and other factors in making a diagnosis. Medical students who participated in the study were taught the SGA technique by a licensed dietician. Functional capacity was measured with a handgrip dynamometer. Prior to surgery, the patient's height and weight were recorded. Body mass index (BMI) was determined by the anthropometric data. Each individual's protein and energy needs after surgery were also calculated. The Harris-Benedict equation was used to calculate calorie (energy) requirements, and an individual stress factor of 1.2 or 1.3 was used. Protein intake should be between 1.2 and 1.5 grams per kilogram of body weight per day. They evaluated the patient's stress factors and protein needs in light of the extent of the surgical procedure and other metabolic stressors.

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Results

Out of the initial pool of 34 patients, 20 met the criteria for inclusion in the study. Table 1 summarizes the demographics of the sample used in the study. There was a balanced number of male and female participants in the sample. Seventy-two percent of patients experienced incision wound infection or dehiscence as a postoperative consequence. During the course of the trial, there were no reported deaths among the subjects. Most of the patients were of average weight, a few were slightly overweight, and nobody was severely obese or underweight. The SGA definition of nutritional status revealed, however, that only 20% of the subjects fell into the "well-nourished" category. The remaining 80% ranged from mild to severe malnutrition.

Table 1: The study population's age distribution

Sr. No.	Age	Frequency
1.	<20	04
2.	21-40	05
3.	41-60	01
4.	>60	10
5.	Total	20

There is a representation of the table shows the Age Distribution of the research Population.

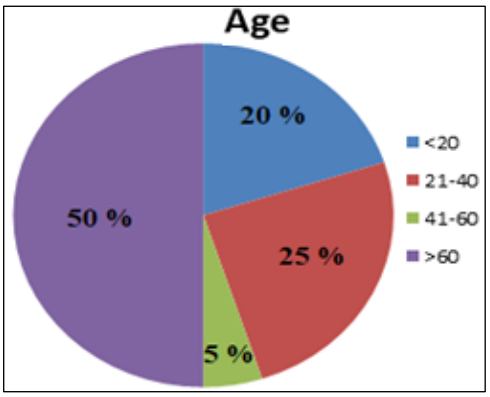

Fig 1: The study population's age distribution

Gender

The majority of the people in the study population were females (12 total), whereas there were just 08 males. The gender makeup of the population under research is accurately depicted here.

Table 2: The study population's gender composition

Sr. No.	Gender	Frequency
1.	Female	12
2.	Male	08
	Total	20

In this study, patients' functional capacity was evaluated by measuring their handgrip strength on days prior to surgery and three days after surgery. In Figure 2, we see a contrast in the handgrip strength at the two different times. The median handgrip strength for the entire study group dropped dramatically from 22.3 kg before surgery to 18.4 kg afterward. We then analyzed handgrip strength by SGA class.

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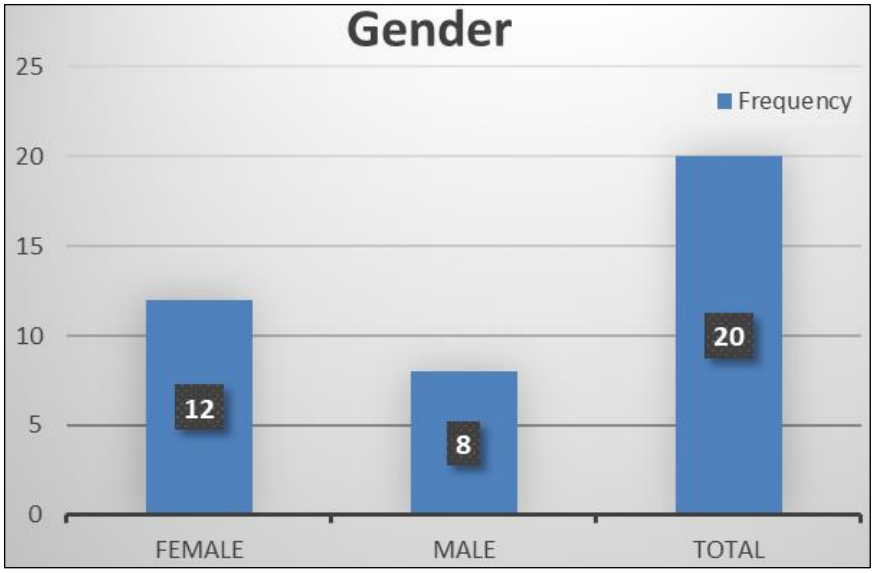

Fig 2: The study population's gender composition

Patients' daily needs for calories and protein were determined after taking into consideration their baseline physiological demands and the strain of surgery. The standard hospital fare consisted of sweetened morning porridge and lunch and dinner meals paired with beans, cabbage, or both. We analyzed the diet and estimated the overall amount of energy and protein it delivered. Total energy needs versus what was delivered, as well as protein needs versus what was served. The hospital food severely under-supplied both total calories and protein when compared to the predicted needs. The average length of stay for patients with mild to moderate malnutrition was 5 days.

Discussion

In a sample of surgical patients undergoing laparotomy at a tertiary referral hospital, this is the first study to evaluate nutritional status, nutritional treatments, and outcomes. According to the results, eighty percent of the patients were malnourished, with twenty-eight percent being severely malnourished. Patients are referred from district hospitals that serve rural areas, and at least 39% are food insecure, so this finding is not shocking [19, 20]. Hospitalized adult malnutrition has been found to be less common in other studies conducted in low-resource areas of Africa. Rates were 47% and 59% in Uganda and Burundi, respectively. Malnutrition affected 78% of adult inpatients in low-income regions of Brazil; this included more than 50% of surgery patients. Half or more of adult inpatients are malnourished in several upper-middle income nations [21]. The prevalence of malnutrition among surgical inpatients may be as high as 48% even in countries with high per capita incomes such as Australia and the United States of America. Therefore, the current study's higher rate of malnutrition is likely due to the combined effect of disease processes and inadequate sustenance due to food insecurity. In this study, patients' nutritional status was evaluated using the SGA classification, which has been shown to be reliable for use in hospital settings. BMI did not identify anyone as undernourished, and obesity statistics are based on research conducted primarily on Caucasian populations, despite the fact that eighty percent of the patients were classified as malnourished using the SGA classification. Because changes in fluid status might obfuscate weight fluctuations, BMI is not helpful in a critically ill patient whose metabolism is fluctuating rapidly [22]. Therefore, in these kinds of therapeutic circumstances, SGA is superior to BMI. Since SGA does not require any special equipment or anthropometric measurements, it may be implemented easily and affordably hospitals. Consistent with previous research, we found that the severity of preoperative malnutrition as measured by SGA class was associated with postoperative problems and length of hospital stay. Having a low SGA class has been linked to a higher mortality rate in other research. This discovery highlights the need for a competent nutritional assessment before surgery [23]. To the best of our knowledge, does not conduct any kind of standardized nutritional screening or assessment on its adult inpatients at this time. Patients who could benefit from a 7-to 10-day nutrition repletion period prior to surgery are therefore missed. Patients at high risk of malnutrition could be identified for preoperative nutrition therapy using simple screening measures like the Nutrition Risk Score 2002, Mini Nutrition Assessment, and the Malnutrition Universal Screening Tool. There was a statistically significant decrease in handgrip strength between the preoperative evaluation and the third postoperative day. This is a symptom of a reduction in functional capacity caused by wasting away of muscle tissue [24]. Patients undergoing major surgery are at risk for acute disease-related malnutrition because of metabolic reactions including increased muscle proteolysis and increased energy demand; in this case, an excess of adipose tissue will not prevent catabolism of lean tissue. Protein and energy intake

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cannot cure this catabolic state, but it can moderate the loss of lean body mass, reduce the inflammatory response, and preserve the gastrointestinal tract's function as a primary immunological organ. The present study confirms previous research showing a strong relationship between handgrip strength and nutritional status in hospitalized patients. In addition, this method is more rapid than anthropometric or laboratory methods in capturing an objective change in nutritional status [25].

This study found that a patient's pre- and post-operative handgrip strength was inversely associated to their hospital stay and complication rates. These findings show that an increase in the likelihood of complications was linked to a drop in nutritional status while in hospital. These results highlight the need for both pre-operative nutritional optimization and post-operative nutritional therapies [26]. Nutritional support following surgery helps patients keep the muscle mass and healthy immune systems they'll need to recover. Oral, enteral, or parenteral nutrition supplementation should be started as soon as feasible following surgery for a patient who already shows severe muscular wasting. Patients typically begin a liquid diet 24 hours after surgery, provided they are making normal bowel sounds. The transition to a normal solid diet occurs over time. In rare instances, doctors will recommend a high-protein diet that includes things like eggs and milk [27]. However, due to limited resources, HPD is not always available from the kitchen. Otherwise, there are no nutritionally-targeted treatments that may be implemented. This study found that the typical hospital food severely lacked in both calories and protein. A diet so lacking in nutrients would do nothing to prevent the loss of muscle. Inadequate for adult tissue healing and a number of immunological activities. Four patients in the current investigation had indications for postoperative parenteral nutrition according to ESPEN recommendations, but no such nutrition was administered. Inadequate postoperative nutrition assistance may also be reflected in a general loss in handgrip strength and a high rate of complications, especially in underweight patients. Consequences arise from the unchecked muscular catabolism that ensues. Loss of 10% of lean mass has been linked to decreased immunity and compromised skin quality, whereas loss of 40%-45% of lean body mass is fatal [28-31].

Effective interventions include proper nutritional management. Nutrition therapies in malnourished patients have been shown to reduce the risk of postoperative infection complications by 42% and noninfectious complications by 26%, according to a recent meta-analysis of randomized controlled trials [32-34]. A decrease of 2.6 days in the average length of hospital stay was also observed. Cost-effectiveness is another benefit of implementing nutritional therapy. Hospital charges for malnourished patients are 31-38% greater than those of healthy patients, according to studies. As a result, hospitalization rates, mortality rates, and their associated expenditures would all be decreased by nutritional interventions. Based on the results of this research, dietary interventions could be a game-changer for the quality of health care [35-37]. It is crucial to have access to licensed clinical dietitians who can evaluate and oversee a patient's unique nutrition treatment plan. There are currently no dietitians employed by the government in their hospitals. However, the first class of students in a program to educate future dietitians is already in session. Food, vitamins, enteral formula, and parenteral solutions containing sufficient nutrients must also be readily available. Hospitals are urged to include nutritional management for adults as part of their standard care for those who can benefit from it, according to the results of a new study [38-42].

Conclusion

Malnutrition is extremely common among surgical patients undergoing laparotomy at a tertiary hospital, according to this observational study. Severe malnourished individuals were more likely to have difficulties after surgery and to require a longer hospital stay. Patients who undergo laparotomy surgery may benefit from enhanced nutritional support. There needs to be more research done in this area, ideally with a larger sample size and involving hospitals and other patient populations.

Conflict of Interest: None.

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