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Original Article

The Incidence of Malnutrition in Surgical Patients and its Impact on Post-operative Outcome: A Prospective Study

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Abstract

Introduction: The outcome of surgical procedures is influenced by a variety of factors, including the quality of care, patient characteristics, pre-operative risk factors, and operative details. Outcomes can be measured across a variety of dimensions, and different risk factors may have a differential relative impact on a specific complication. The reported prevalence of malnutrition in patients scheduled for abdominal surgery is up to 50%. American Society of Anesthesiology score mentioned that malnutrition apart from pre-operative sepsis, emergency surgery, open surgery, long duration of surgery, and massive intraoperative blood loss is an important predictor of poor post-operative outcome.

Aims: The aim of the study was to identify the incidence of malnutrition, assess the effectiveness of various screening tool to identify patients with malnutrition and to correlate the incidence of malnutrition with post-operative complications and duration of Hospital stay.

Methods: This study included 300 consecutive patients admitted to the department of general surgery for any abdominal surgery, and a specific inclusion and exclusion criteria was followed.

Results: There was a male preponderance (58%) and predominant age was 51-70 years and commonest surgery was laparoscopic cholecystectomy (38%) followed by Herniorraphy (30%). When differences in various postoperative complications were compared, it was observed that patients in PG SGA Stage B and C had a higher complication rate with *P*-value being significant across all the parameters.

Discussion: Sorting out the determinants of surgical outcomes is important because the identification of adjustable risk factors underlies attempts to improve outcomes. Moreover, low socioeconomic status, Indian customs pose an additional risk. Apart from most pre-operative risk factors or post-operative complications that cannot be corrected, nutritional risk can be potentially improved by adequate nutritional support.

Conclusion: Early detection of nutritional risk would allow for early intervention which could prevent subsequent post operative complications.

Key words: Malnutrition, Nutritional therapy, Post-operative, Pre-operative

INTRODUCTION

The outcome of surgical procedures is influenced by a variety of factors, including the quality of care, patient characteristics, pre-operative risk factors, and operative details. Outcomes can be measured across a variety of dimensions, and different risk factors may have a differential relative impact on a specific complication. The reported prevalence of malnutrition in patients scheduled for abdominal surgery is up to 50%. Malnutrition is mainly caused by decreased oral intake, tumor-related cachexia, impaired digestive capacity, and destruction of gastrointestinal tract in addition to hypermetabolic, catabolic state created by the stress of surgery. American Society of Anesthesiology (ASA) score mentioned that malnutrition apart from pre-operative sepsis,

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emergency surgery, open surgery, long duration of surgery, and massive intraoperative blood loss is an important predictor of poor post-operative outcome.

The ASA classification is a physical status classification system which consists of five categories of increasing severity.[1] Very briefly, ASA class I denotes a completely healthy fit patient. ASAII and III denote a patient with mild systemic and severe systemic disease that is not incapacitating, respectively. ASA IV refers to a patient with an incapacitating disease that is a constant threat to life and Class V a moribund patient. Sorting out the determinants of surgical outcomes is important because the identification of adjustable risk factors underlies attempts to improve outcomes. Moreover; low socioeconomic status, Indian customs, and restricting particular food intake – pose an additional risk. Numerous studies have explored the association between outcomes and risk factors for surgical procedures. Different from most pre-operative risk factors of postoperative complications that cannot be corrected, nutritional risk can be potentially improved by adequate nutritional support. Early detection of nutritional risk would allow for early intervention which could prevent later complications.[2-5]

Recent studies have demonstrated the benefits of screening pre-operative nutritional status and appropriate surgical care treatment. Several nutritional screening tools have been developed for this purpose including mini nutritional assessment (MNA), Malnutrition Universal Screening Tool, MNA-short form (SF), and the subjective global assessment (SGA).

Malnutrition is the greatest single threat to the world's public health. Despite its high prevalence among hospitalized patients, it is routinely underdiagnosed and remains unaddressed, especially in developing nations. Worldwide, 20%–50% of hospitalized patients are malnourished.

The fact that this percentage seems to be unchanged over time is alarming. Pre-operative nutritional screening is not routinely conducted in many Indian tertiary care hospitals. A thorough literature search failed to show any scientific study performed in the past to assess the pre-operative nutritional status among Indian patients and was, therefore, the main reason for conducting this study.

Complications were defined as any deviation from the normal post-operative course and were classified into four severity grades according to the definitions of Clavien *et al.* [Table 1]. Grade 1 included minor risk events not requiring therapy. Grade 2 complications were defined as potentially life-threatening complications with the need of intervention or a hospital stay longer than twice the median hospitalization for the same procedure. Grade 3 complications were defined as complications leading to lasting disability or organ resection. A Grade 4 complication indicated death of a patient due to a complication. The study ended for each patient at discharge and there was no follow-up of the patients thereafter. No complications of deaths were recorded after the discharge of the patients from the hospital. Hence, the aim of this study was to explore the incidence of malnutrition in surgical patients in a single-center prospective study and identify the complications associated with it using a pre-defined standardized nutritional assessment tool.[6-8]

Aims

The aim of the study was to identify the incidence of malnutrition in our study population, assess the effectiveness of patient-generated (PG) SGA as a screening tool to identify patients with malnutrition, and compare with more widely used nutrition screening tools like body mass index (BMI) scoring and to correlate the incidence of malnutrition with post-operative complications, post-operative intensive care unit (ICU) and duration of Hospital stay.

MATERIALS AND METHODS

This study included 300 consecutive patients admitted to the department of general surgery for any abdominal surgery excluding day cases and emergency surgeries at KPC Medical College and Hospital, Kolkata, India, between January 2023 and December 2023 (12 months).

The patients were randomized into two groups using a random number generator (1–300).

PG-SGA score pro forma was given to half the patients and they were asked to fill up her inputs; BMI score was plotted in standard charts using the patient's concerned parameters.

Nutritional status was also assessed on admission by anthropometric measurements such as BMI, MAC, and TSFT. Hemoglobin (Hb) and Albumin were noted for all the patients.

Inclusion Criteria

The following criteria were included in the study:

- Patients willing to participate in the study
- Patients aged 18 years or older and able to give consent
- Patients admitted in the in-patient department
- Patients undergoing elective abdominal surgery.

Exclusion Criteria

The following criteria were excluded from the study:

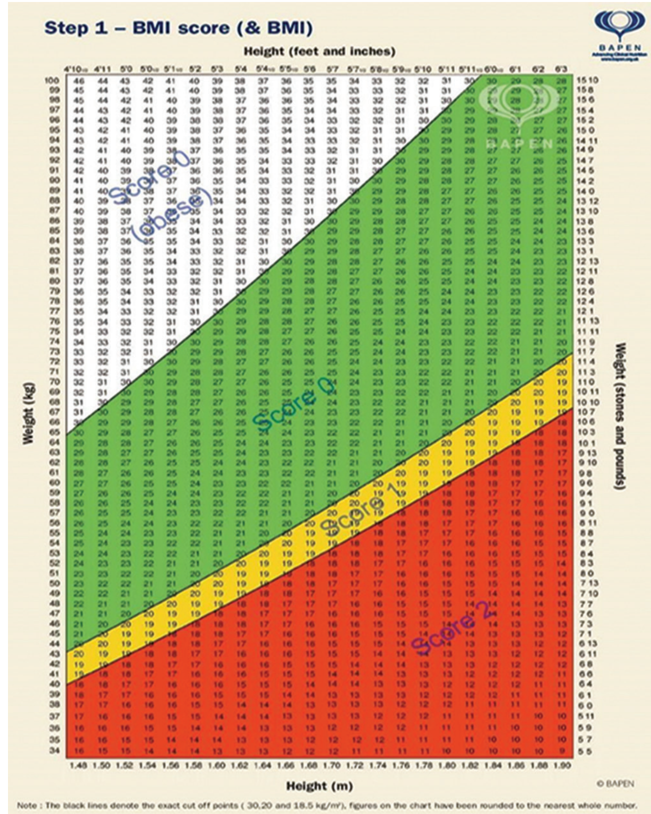
- Any surgery apart from abdominal surgery
- Patients not willing to participate in the study
- Patients requiring emergency surgical intervention
- Day care surgeries.

Data Collection and Outcomes

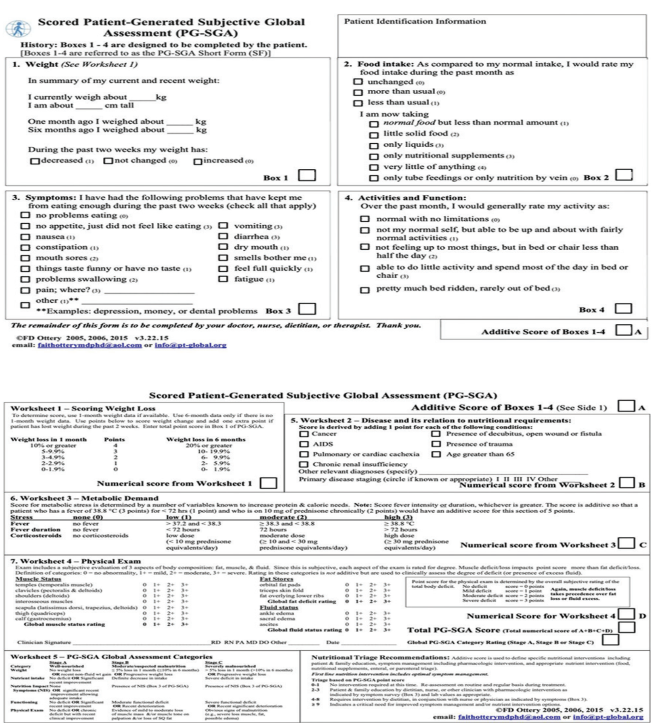
- Albumin and Hb were tested and recorded within 1 week before surgery.
- Age, sex, BMI, and ASA grade were also recorded.
- In addition, we also collected operation time, blood loss, post-operative complications, post-operative ICU admission rate, and length of hospital stay (LOS).
- Post-operative complications were further defined using the Claviene-Dindo classification system.
- The magnitude of the operations was assessed using the physiological and operative severity score for the enumeration of mortality categories (minor, intermediate, major, and major plus).

Statistical Analysis

Categorical variables were presented as numbers (percentage) and continuous variables were as mean (standard deviation) if they were normally distributed or as median (interquartile range) if they did not follow the normal distribution. Associations between categorical variables were examined using Pearson's Chi-square test. For the comparison of the distribution of continuous variables parametric (*t*-test) or non-parametric tests (Mann–Whitney U test) were used. A multiple logistic regression analysis was performed to determine independent factors associated with the prevalence of malnutrition, and the occurrence of post-operative complications. Covariates in each multiple regression model were independently selected if their p value on univariable analysis for that particular outcome was 0.05 or less. All *P* values significance level was chosen to be 0.05. All calculations were performed with the Statistical Package for the Social Sciences (SPSS) ver. 26.0 (SPSS Inc., Chicago, IL, USA).



Clavien Dindo Classification



Scored Patient-Generated Subjective Global Assessment (PG-SGA)

History: Boxes 1 - 4 are designed to be completed by the patient.
[Boxes 1-4 are referred to as the PG-SGA Short Form (SF)]

Patient Identification Information

1. Weight *(See Worksheet 1)*
In summary of my current and recent weight:
I currently weigh about ______kg
I am about ______ cm tall
One month ago I weighed about ______ kg
Six months ago I weighed about ______ kg
During the past two weeks my weight has:
☐ decreased (1) ☐ not changed (0) ☐ increased (0)
Box 1 ☐

2. Food intake: As compared to my normal intake, I would rate my food intake during the past month as
☐ unchanged (0)
☐ more than usual (0)
☐ less than usual (1)
I am now taking
☐ *normal food* but less than normal amount (1)
☐ little solid food (2)
☐ only liquids (3)
☐ only nutritional supplements (3)
☐ very little of anything (4)
☐ only tube feedings or only nutrition by vein (0) Box 2 ☐

3. Symptoms: I have had the following problems that have kept me from eating enough during the past two weeks (check all that apply)
☐ no problems eating (0)
☐ no appetite, just did not feel like eating (3) ☐ vomiting (3)
☐ nausea (1) ☐ diarrhea (3)
☐ constipation (1) ☐ dry mouth (1)
☐ mouth sores (2) ☐ smells bother me (1)
☐ things taste funny or have no taste (1) ☐ feel full quickly (1)
☐ problems swallowing (2) ☐ fatigue (1)
☐ pain; where? (3) ______
☐ other (1)** ______
**Examples: depression, money, or dental problems Box 3 ☐

4. Activities and Function:
Over the past month, I would generally rate my activity as:
☐ normal with no limitations (0)
☐ not my normal self, but able to be up and about with fairly normal activities (1)
☐ not feeling up to most things, but in bed or chair less than half the day (2)
☐ able to do little activity and spend most of the day in bed or chair (3)
☐ pretty much bed ridden, rarely out of bed (3)
Box 4 ☐

The remainder of this form is to be completed by your doctor, nurse, dietitian, or therapist. Thank you.
Additive Score of Boxes 1-4 ☐ A
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email: faithotterymdphd@aol.com or info@pt-global.org

Scored Patient-Generated Subjective Global Assessment (PG-SGA)
Additive Score of Boxes 1-4 (See Side 1) ☐ A

Worksheet 1 – Scoring Weight Loss
To determine score, use 1-month weight data if available. Use 6-month data only if there is no 1-month weight data. Use points below to score weight change and add one extra point if patient has lost weight during the past 2 weeks. Enter total point score in Box 1 of PG-SGA.

Weight loss in 1 month	Points	Weight loss in 6 months
10% or greater	4	20% or greater
5-9.9%	3	10- 19.9%
3-4.9%	2	6- 9.9%
2-2.9%	1	2- 5.9%
0-1.9%	0	0- 1.9%

Numerical score from Worksheet 1 ☐

5. Worksheet 2 – Disease and its relation to nutritional requirements:
Score is derived by adding 1 point for each of the following conditions:
☐ Cancer ☐ Presence of decubitus, open wound or fistula
☐ AIDS ☐ Presence of trauma
☐ Pulmonary or cardiac cachexia ☐ Age greater than 65
☐ Chronic renal insufficiency
Other relevant diagnoses (specify) ______
Primary disease staging (circle if known or appropriate) I II III IV Other ______
Numerical score from Worksheet 2 ☐ B

6. Worksheet 3 – Metabolic Demand
Score for metabolic stress is determined by a number of variables known to increase protein & caloric needs. **Note:** Score fever intensity or duration, whichever is greater. The score is additive so that a patient who has a fever of 38.8 °C (3 points) for < 72 hrs (1 point) and who is on 10 mg of prednisone chronically (2 points) would have an additive score for this section of 5 points.

Stress	none (0)	low (1)	moderate (2)	high (3)
Fever	no fever	> 37.2 and < 38.3	≥ 38.3 and < 38.8	≥ 38.8 °C
Fever duration	no fever	< 72 hours	72 hours	> 72 hours
Corticosteroids	no corticosteroids	low dose (< 10 mg prednisone equivalents/day)	moderate dose (≥ 10 and < 30 mg prednisone equivalents/day)	high dose (≥ 30 mg prednisone equivalents/day)

Numerical score from Worksheet 3 ☐ C

7. Worksheet 4 – Physical Exam
Exam includes a subjective evaluation of 3 aspects of body composition: fat, muscle, & fluid. Since this is subjective, each aspect of the exam is rated for degree. Muscle deficit/loss impacts point score more than fat deficit/loss. Definition of categories: 0 = no abnormality, 1+ = mild, 2+ = moderate, 3+ = severe. Rating in these categories is *not* additive but are used to clinically assess the degree of deficit (or presence of excess fluid).

Muscle Status: temples (temporalis muscle), clavicles (pectoralis & deltoids), shoulders (deltoids), interosseous muscles, scapula (latissimus dorsi, trapezius, deltoids), thigh (quadriceps), calf (gastrocnemius), Global muscle status rating — 0 1+ 2+ 3+
Fat Stores: orbital fat pads, triceps skin fold, fat overlying lower ribs, Global fat deficit rating — 0 1+ 2+ 3+
Fluid status: ankle edema, sacral edema, ascites, Global fluid status rating — 0 1+ 2+ 3+

Point score for the physical exam is determined by the overall subjective rating of the total body deficit. No deficit score = 0 points; Mild deficit score = 1 point; Moderate deficit score = 2 points; Severe deficit score = 3 points. Again, muscle deficit/loss takes precedence over fat loss or fluid excess.

Numerical Score for Worksheet 4 ☐ D
Total PG-SGA Score (Total numerical score of A+B+C+D) ☐
Clinician Signature ______ RD RN PA MD DO Other ______ Date ______
Global PG-SGA Category Rating (Stage A, Stage B or Stage C) ☐

Worksheet 5 – PG-SGA Global Assessment Categories

Nutritional Triage Recommendations: Additive score is used to define specific nutritional interventions including patient & family education, symptom management including pharmacologic intervention, and appropriate nutrient intervention (food, nutritional supplements, enteral, or parenteral triage).
First line nutrition intervention includes optimal symptom management.
Triage based on PG-SGA point score
0-1 No intervention required at this time. Re-assessment on routine and regular basis during treatment.
2-3 Patient & family education by dietitian, nurse, or other clinician with pharmacologic intervention as indicated by symptom survey (Box 3) and lab values as appropriate.
4-8 Requires intervention by dietitian, in conjunction with nurse or physician as indicated by symptoms (Box 3).
≥ 9 Indicates a critical need for improved symptom management and/or nutrient intervention options.
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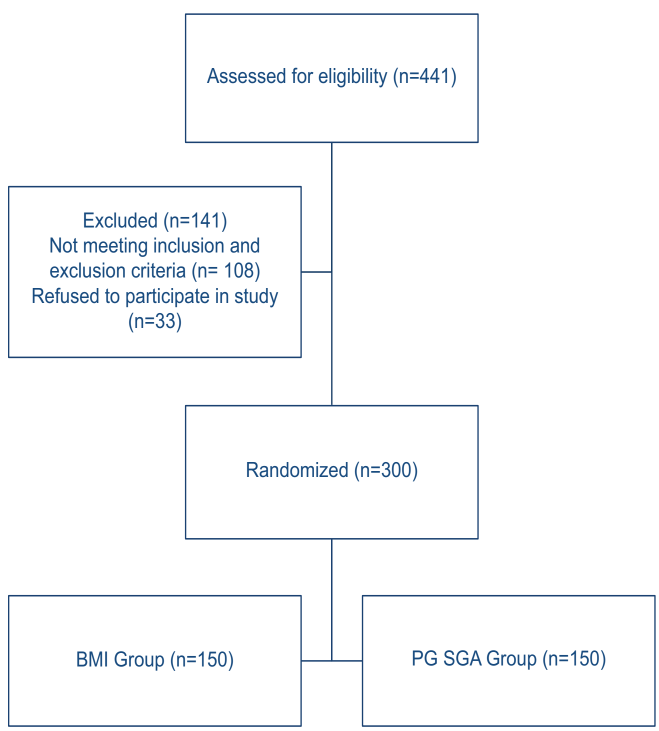
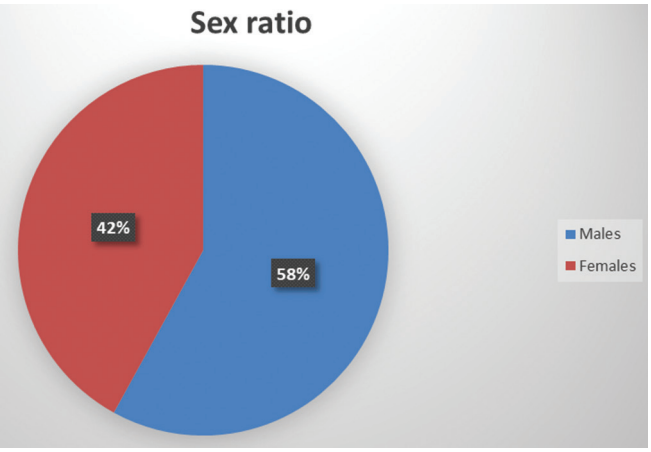
PG SGA Chart



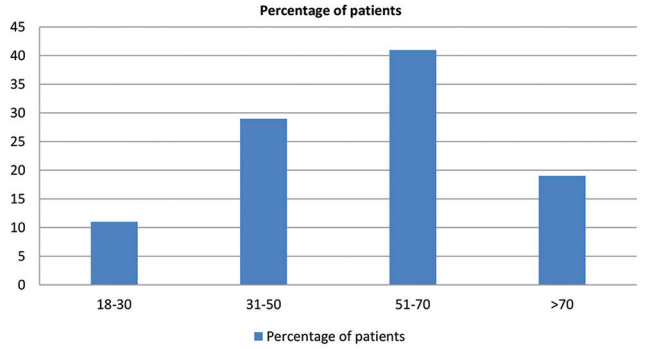
Consort Diagram

RESULTS

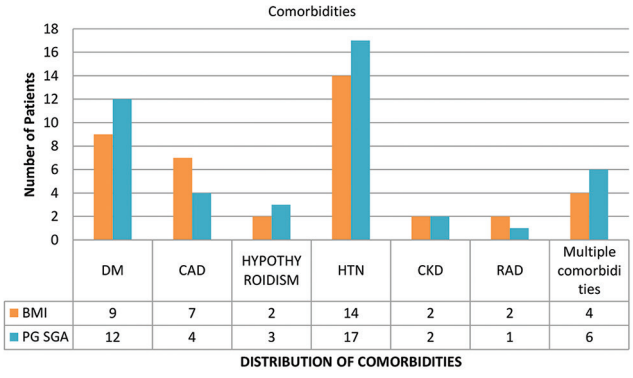
A total of 300 patients were included in the final analysis.



- About 58% of the total population selected for the study were males and 42% were females.



- When we studied the percentage distribution of patients as per age group, we saw that the majority of the patients were between the age group of 31–70 years old.



- Hypertension was the most common comorbidity in the study population followed by diabetes mellitus and 3% population had multiple comorbidities.

Indicator	BMI	PG SGA	*P*-value
Age (Mean)	18–80 (43.04)	20–79 (42.6)	0.9620
Sex Ratio (M: F)	80:55	94:71	0.2885
ASA GRADE (I, II, III, IV+V) (%)	3.4%, 49.9%, 42%, 3.6%	2.8%, 44.3%, 47%, 5.9%	0.8095
Patients with uncontrolled Diabetes	4	7	0.3657
number of patients with more than one comorbidity	11.7%	13.5%	0.7199
Smokers	31	24	0.3452
On Anticoagulant/ Antiplatelets	14	11	0.5485
Hemoglobin (Mean) g/dL	10.31	13.67	0.4926
Albumin (Mean) g/dL	3.685	3.570	0.9659
BUN (Mean) mg/dL	13.780	15.520	0.7478
Physiological and Operative Severity Score for the enumeration of Mortality Category Intermediate, Major and Major PlusSurgeries	44.6%	48.1%	0.7162
Mean estimated blood loss in mL	112.3 mL	126.4 mL	0.3614

- The study groups were observed for various pre-operative factors that may be associated with post-operative surgical complications and outcomes and both the study groups had shown an equivalent distribution in the study population with *P* value being insignificant.

Table 1: Classification of surgical complications

Grade	Definition
Grade I	Any deviation from the normal postoperative course without the need for pharmacological treatment or surgical, endoscopic, and radiological interventions Allowed therapeutic regimens are: drugs as antiemetics ,antipyretics, analgesics,diuretics,elect rolytes,and physiotherapy. This grade also includes wound infections opened at the bedside
Grade II	Requiring pharmacological treatment with drugs other than such allowed for grade I complications Blood transfusions and total parenteral nutrition are also included
Grade III	Requiring surgical, endoscopic or radiological intervention
Grade IIIa	Intervention not under general anaesthesia
Grade IIIb	Intervention under general anaesthesia
Grade IV	Life-threatening complication (including CNS complications) requiring ICU/IC management
Grade IVa	Single organ dysfunction (including dialysis)
Grade IVb	Multiorgan dysfunction
Grade V	Death of a patient
Suffix "d"	If the patient suffers from a complication at the time of discharge ,the suffix "d"(for "disability")is added to the respective grade of complication. This label indicates the need for a follow-up to fully evaluate the complication

Distribution of BMI Grading (Group-A) [Table 2]

- When we look at the percentage distribution of patients in various BMI classes, we can see that a large percentage of the patients were underweight.

Distribution of PG – SGA Scoring (Group B) [Table 3]

As per the PG SGA, we saw a large section of the population was in Stage A.

Distribution of Clavien-Dindo Classification (applied) to Assess Post-operative Complication Rates [Table 4]

- The most common surgery performed was laparoscopic cholecystectomy (38%), followed by Hernia repair (Lap + Open) (30%)
- Lower GI surgeries both benign and malignant (26%); followed by upper GI benign and malignant (4%) and misc (2%)
- Average duration of stay in the hospital (post-op) was: 4.5 ± 2 days
- Twelve patients needed ICU stay postoperatively and the average post-operative ICU stay was 3 ± 1.

Indicator	PG SGA Stage A	PG SGA Stage B+C	*P*-value
Number of patients	210	86	0.0451
Average length of hospital stay	3±2 days	6±days	0.0317
Number of intensive care unit admissions	5	8	0.0165
Number of post-operative transfusion	3	2	0.0457
Number of patients with surgical site infections	14	17	0.02820
Post-operative ileus	2	9	0.0116
Clavien Dindo classification			
Grade 1	16	25	0.0498
Grade 2	7	6	0.1615
Grade 3	4	7	0.0657
Grade 4+5	2	4	0.0142

PG SGA: Patient-generated – subjective global assessment

When we compared the differences in various post-operative complications like LOS, ICU admission rate, need for post-operative transfusions, and number of patients developing post-operative ileus we saw that patients in PG SGA Stage B and C had a higher complication rate with *P*-value being significant across all the parameters. This confirmed that patients with malnutrition did indeed have a higher incidence in surgical complications.

DISCUSSION

This study has assessed various clinical and social variables as predictors of malnutrition risk in patients undergoing general surgery. Patients at medium or high risk for malnutrition more often experienced post-operative complications and significantly longer post-operative stays. The impact of malnutrition risk remained for post-operative stay and post-operative death after adjusting for several confounding factors such as the site of surgery, the magnitude of the operation, comorbidities, functional independence, and diagnosis of cancer. These results point out the significance of malnutrition in general geriatric surgery patients and provide rationale for nutritional assessment to those who are at greater risk for dismal postoperative outcomes.

Table 2: Body mass index grading (Group-A)

Subgroups	% of patients (among 300)
Underweight	55
Normal	30
Overweight	8
Obesity (1st Class)	4
Obesity (2nd Class)	2
Obesity (3rd Class)	1

Table 3: Patient-generated-subjective global assessment scoring (group B)

Aggregate score	% of patients (Among 300)
Stage A	68
Stage B	22
Stage C	10

Table 4: Clavien-Dindo classification

Grades	Number of patients
Grade-I	20
Grade-II	13
Grade-III	8
Grade III A	5
Grade III B	3
Grade-IV	3
Grade-V	1

There is a range of tools such as the malnutrition screening tool, the nutrition risk index, SGA, the MNASF, and the nutritional risk screening (NRS-2002). However, BMI is one of the commonly used indices to assess nutritional status in the hospital. BMI underestimates malnutrition due to its high specificity. The PGA SGA screening tool, which is a validated score questionnaire, was used to identify patients at risk of malnutrition in this study. There is no consensus regarding the best screening method for the assessment of malnutrition in surgical patients.

This study prospectively evaluated the nutritional status of 300 patients undergoing gastrointestinal surgery on admission and analyzed its impact on post-operative complications. Garth *et al.* evaluated the nutritional status of patients undergoing a major procedure for various gastrointestinal cancer using BMI. Their studies

failed to identify any correlation between BMI and post-operative complications. Thomas *et al.* also confirmed that BMI does not significantly correlate with post-operative complications or the length of hospital stay. The prevalence of malnutrition in the pre-operative setting of gastrointestinal operations has been reported to range from 33% to 88% depending on the population and the screening tools. In a multicenter Belgian study, 66% of patients who were admitted in to hospital to undergo major elective[9,10] abdominal surgery were at high risk of malnutrition. The risk of malnutrition was highest among patients undergoing general surgery/gynecology surgery at 16.3%. In this study, the prevalence of medium/high risk of malnutrition was 45% which is within the wide range of values reported in the literature for surgery patients (estimated between 20% and 55%).

Moreover, it represents the real burden of malnutrition in a general surgery department because the sample was not restricted to specific sites or diseases, nor were the results of general surgery mixed with the results other disciplines. This study found an association of malnutrition risk in the pre-operative setting with smoking, site of surgery, and higher ASA physical status.

Given that the gut is the primary interface between dietary compounds and the immune system, it is expected that a range of cues from the microbiota, pathogens, and dietary components are required for healthy development of gut-associated lymphoid tissue (GALT). Indeed, various micronutrients and nutrient metabolites have been found to act as direct immune stimuli. In addition to nutrient sensing, microbiota sensing through pathogen-recognition receptors is also required for GALT development. Defects in innate and adaptive immune function include for the former, impaired epithelial barrier function of the skin and gut, reduced granulocyte microbicidal activity, fewer circulating dendritic cells, and reduced complement proteins, and for the latter, reduced levels of soluble immunoglobulin in saliva and tears, lymphoid organ atrophy, reduced delayed-type hypersensitivity responses, fewer circulating B cells, a shift from Th1-associated to Th2-associated cytokines. An example of the key pathway bridging nutritional status with immune regulation is the aryl hydrocarbon receptor (AhR). It is evidenced that intraepithelial lymphocytes abundantly express the AhR on their surface, which binds to metabolites of cruciferous vegetables. It is observed that intrinsic AhR signaling is essential for accurate lymphocyte localization in the gut and skin. Moreover, lymphoid tissue-inducer cells express AhR and retinoic acid receptor (RAR)-related orphan receptor (ROR) γt, which interacts with the Vitamin A metabolite retinoic acid, demonstrating a mechanistic link between nutrient sensing and immune development. Given that the proper function of the immune system plays a pivotal role for the surgical patient proper nutrient supply is proved to positively correlate with key components of post-operative course. Immunonutrients (nutrients with measurable effect on the immune system through their supplementation) such as polyunsaturated/omega-3 fatty acids, arginine, glutamine, antioxidants, and nucleotides, have been found to reduce infection rates and the length of the hospital stay.[11,12]

Malnutrition is a partially modifiable risk factor for post-operative complications. Pre-operative nutritional conditioning which includes nutritional counseling, fortified diets, oral nutritional supplements, and where necessary parenteral nutrition should be considered obligatory according to recent ESPEN guidelines, particularly in malnourished patients undergoing abdominal operations, hence further highlighting the need for routine nutritional screening in surgical patients.[13,14]

This is why nutritional conditioning is a pillar of prehabilitation programs which have gained popularity in recent times combining structured physical exercise, nutrition interventions, optimization of medical problems and even psychological support up to 6 weeks before abdominal surgery. This strategy has the potential to significantly reduce the incidence of postoperative complications, to maintain the functional capacity of the patients in the postoperative period, to reduce the duration of postoperative stay and to improve the quality of life of the patients.

The results of this study show an association of positive PG SGA screening with post-operative complications. Moreover, they suggest the PG SGA score as an independent predictorof hospital stay and postoperative death.

The current study found less correlation between BMI (Subjective) and postoperative complications as compared to when PG-SGA Scoring criteria (subjective + objective) was used.

A limitation of this study is the non-homogeneous population in terms of surgical procedures.

CONCLUSION

This study showed a high prevalence of malnutrition risk in patients undergoing general surgery. Malnutrition persists to be a significant burden on health-care facilities worldwide. Pre-operative malnutrition is a modifiable and treatable cause of perioperative morbidity. The impact of

pre-operative nutritional status on post-operative outcomes has to be acknowledged. Nutritional status of all patients be assessed on admission and preferably made mandatory. Drafting of a nutrition care program is very much required to prevent adverse post-operative outcomes.

REFERENCES

1. Kruizenga HM, Wierdsma NJ, Van Bokhorst MA, De van der Schueren, Haollander HJ, Jonkers-Schuitema CF, *et al*. Screening of nutritional status in the Netherlands. Clin Nutr 2003;22:147-52.
2. Correia MI, Campos AC. Prevalence of hospital malnutrition in Latin America: The multicenter ELAN study. Nutrition 2003;19:823-5.
3. Huong PT, Lam NT, Thu NN, Quyen TC, Lien DT, Anh NQ, *et al*. Prevalence of malnutrition in patients admitted to a major urban tertiary care hospital in Hanoi, Vietnam. Asia Pac J Clin Nutr 2014;23:437-44.
4. Garth AK, Newsome CM, Simmance N, Crowe TC. Nutritional status, nutrition practices and post-operative complications in patients with gastrointestinal cancer. J Hum Nutr Diet 2010;23:393-401.
5. Thomas EJ, Goldman L, Mangione CM, Marcantonio ER, Cook EF, Ludwig L, *et al*. Body mass index as a correlate of postoperative complications and resource utilization. Am J Med 1997;102:277-83.
6. Braga M, Gianotti L, Nespoli L, Radaelli G, Di Carlo V. Nutritional approach in malnourished surgical patients: A prospective randomized study. Arch Surg 2002;137:174-80.
7. Naber TH, Schermer T, De Bree A, Nusteling K, Eggink L, Kruimel JW, *et al*. Prevalence of malnutrition in nonsurgical hospitalized patients and its association with disease complications. Am J Clin Nutr 1997;66:1232-9.
8. Holmes S. The effects of under nutrition in hospitalised patients. Nurs Stand 2007;22:35-8.
9. Waitzberg DL, Ravacci GR, Raslan M. Hospital hyponutrition. Nutr Hosp 2011;26:254-64.
10. STOP Disease-related Malnutrition: Prague Declaration. ENHA Joins with the Czech Presidency of the EU; 2009.
11. Jensen GL. Inflammation as the key interface of the medical and nutrition universes: A provocative examination of the future of clinical nutrition and medicine. JPEN J Parenter Enteral Nutr 2006;30:453-63.
12. Hill GL, Blackett RL, Pickford I. Malnutrition insurgical patients. An unrecognized problem. Lancet 1977;1:689-92.
13. Gottraux S, Maisonneuve N, Gevaux D, Fonzo-Christe C, Chiki M, Guinot-Bourquin S, *et al*. Screening and treatment of malnutrition: European Council Resolution and its potential application in Switzerland. Rev Med Suisse Romande 2004;124:617-23.
14. Lean M, Wiseman M. Malnutrition in hospitals. BMJ 2008;336:290.

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