

Original Research Article

Assessment of nutritional status, pre-operative nutrition supplementation and its' impact on the outcome of surgery in gastrointestinal malignancies: a prospective study

Dakshayani S. Nirhale, Amala A. Ghalsasi*, Nisarga V.

Department of General Surgery, Dr. D.Y. Patil University, Pimpri, Pune, Maharashtra, India

Received: 22 October 2019

Revised: 11 December 2019

Accepted: 13 December 2019

*Correspondence:

Dr. Amala A. Ghalsasi,

E-mail: amalaghalsasi@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Gastrointestinal (GI) cancers are responsible for more deaths from cancer than any other cancers. These patients are at risk for disease-related malnutrition which has been linked to an increase in post operative complications. Despite research, guidelines for preoperative nutritional assessment are lacking. The study was aimed to assess the nutritional status of patients in gastrointestinal malignancy, impact of nutritional supplementation and its impact on outcome of surgery.

Methods: This cross-sectional study was conducted on patients of gastrointestinal malignancy attending Dept. of Surgery, Dr. D.Y. Patil Medical College, and Hospital, Pimpri, Pune. Institute Ethics Committee clearance was obtained before starting the study. 45 newly diagnosed patients of gastrointestinal malignancy were included in the study after informed consent.

Results: At the start of this study 26.66% were well nourished, 35.55% moderately nourished, and 37.77% poorly nourished. At 6 weeks after supplementation 60 % were well nourished, 24.4 % moderately nourished, and 7 % poorly nourished. Surgical site infection (SSI) occurred in 7 patients of which 57.14% were poorly nourished, 28.57 % were moderately nourished. Anastomotic leak occurred in 3 patients of which 66.66% patients were poorly nourished. Average number of days of hospital stay for well nourished patients was 6.23 and for poorly nourished patients 14.14.

Conclusions: Malnutrition is a concern in gastrointestinal malignancies. Delay in surgery upto 6 weeks is permissible to enhance patients' nutritional status. Proper nutritional supplementation significantly improves nutritional status. Complications like SSI and anastomotic leak; hospital stay are significantly reduced after improvement in nutritional status.

Keywords: Gastrointestinal malignancy, Nutrition supplement, Surgical site infection

INTRODUCTION

Cancer is a world-wide public health issue affecting all categories of persons. It is among the major global health problem, with an estimated 10 million incidences and 6 million annual mortality rates.¹

Gastrointestinal (GI) cancer is a term for the group of cancers that affect the digestive system, including gastric cancer, colorectal cancer, hepatocellular carcinoma, esophageal cancer and pancreatic cancer. Overall, the GI cancers are responsible for more cancers and more deaths from cancer than any other cancers. There is an

increasing burden (incidence and mortality) in GI cancer worldwide and Asia is no exception.^{2,3}

Globocan data 2018 showed that out of estimated 1.01 million new cases in the year 2018 in India, 2,27,000 were located in GI tract. Similarly, out of about 6,82,000 cancer-related deaths, approximately 1,82,000 deaths were because of GI cancers.⁴

The World Health Organization (WHO) defined the 'nutritional status' as the condition of the body resulting from intake, absorption and utilization of nutrient and the influence of particular physiological and pathological status.⁵

GI cancer patients are at high risk for disease-related malnutrition and cachexia. This is a result of many coexisting factors including aggressive and catabolic biology of the disease, food intake and intestinal passage disturbances, and stress-related anorexia. Therefore, metabolic deterioration of these patients starts long before its clinical effects can be seen.⁶

Nutrition status can be compromised in direct response to tumor-induced alterations in metabolism (i.e., cachexia). Tumor-induced weight loss occurs frequently in patients with solid tumors of the pancreas, and upper GI tract and less often in patients with lower GI cancer. Cachexia is also more common with more-advanced disease.

The etiology of cancer cachexia is not entirely understood, but several factors have been proposed. Altered metabolism of fats, proteins, and carbohydrates is evident in patients with cancer cachexia.⁷

Nutritional status evaluation consists of baseline nutritional assessment, which includes food intake, anthropometric variables and laboratory parameters, subjective global assessment, and body composition measurements.

Several nutritional assessment methods can be used, and must be sensitive enough to identify changes early according to specific nutritional imbalances.⁸ The method of choice depends on the purpose of the assessment, prognosis or even on the response to nutritional interventions.⁹

Poor pre-operative nutritional status has been linked consistently to an increase in post-operative complications including surgical site infection (SSI), anastomotic leak and longer hospital stay.

Despite extensive research in the field of clinical nutrition, definite guidelines to base rational preoperative nutritional assessment and supporting surgical patients are lacking. Thus, it is still difficult for the clinician to decide which patients might benefit from nutritional support and to choose type and route of nutritional support.¹⁰

METHODS

The present study was a cross-sectional study conducted on randomly selected newly diagnosed patients of gastrointestinal malignancy coming to the Dept. of Surgery, Dr. D. Y. Patil Medical College, Hospital and Research Centre, Pimpri, Pune. Institute Ethics Committee Clearance was obtained before the start of the study

Study period

The period of data collection was spread over one and half year months from October 2017 to March 2019.

Sampling method and sample size

45 randomly selected newly diagnosed patients of gastrointestinal malignancy who attend the General Surgery Department were included in the study. Patients were included in the study after taking their voluntary informed consent. Well-nourished patients were not given supplementation, moderately and poorly nourished patients were given supplementation preoperatively and reassessed for improvement in nutritional status.

Inclusion criteria

Patients of age 25- 65 years and all histopathologically proven and operable gastrointestinal malignancy patients (upto stage III A) were included in this study.

Exclusion criteria

Patients of gastrointestinal malignancy presenting with intestinal obstruction, patients with recurrence of gastrointestinal malignancy, pregnancy and immunocompromised patient were excluded in this study.

Statistical analysis

Data analysis was done using the SPSS (Statistical Package for the Social Science) Version 17 for window by using appropriate test of significance like t test, chi-square test, proportion test etc. A probability value of 0.05 was accepted as the level of statistical significance.

RESULTS

In this study maximum number of cases was in the age group of 51-60 years i.e. 37.77% with majority of the patients being above the age of 50 years (Figure 1).

In this study there were 25 male and 20 female patients with slight male predominance (Figure 2).

In this study of 45 patients there were 29 cases of upper gastrointestinal malignancy and 16 cases of lower gastrointestinal malignancy with maximum number of

cases of stomach and colorectal cancer and least of anal canal cancer (Figure 3).

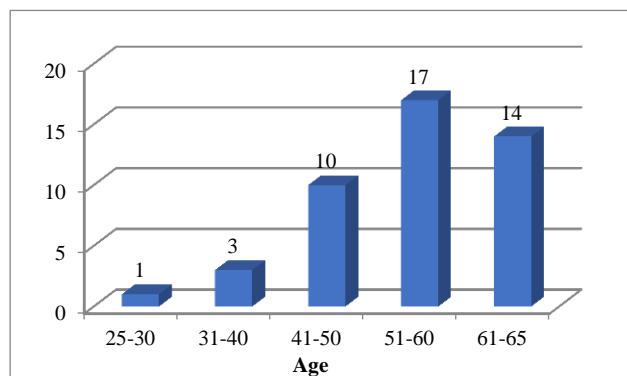


Figure 1: Distribution of cases according to age.

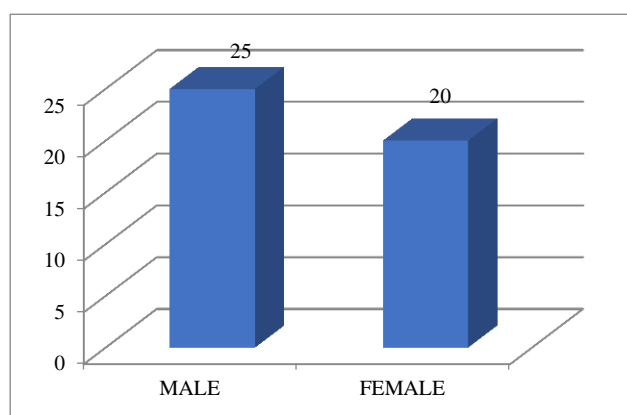


Figure 2: Distribution of cases according to gender.

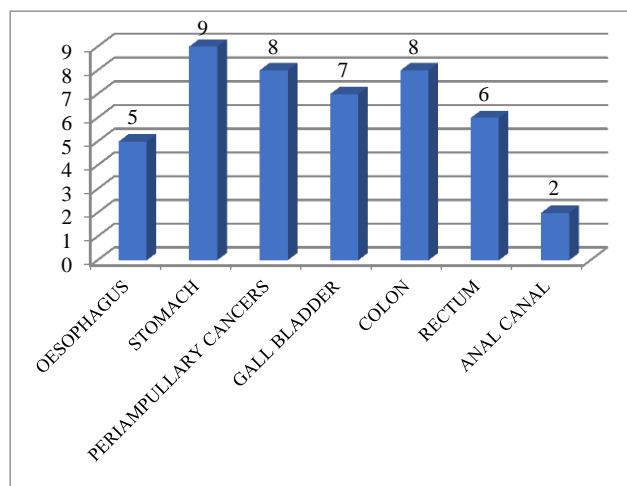


Figure 3: Distribution of cases according to location of malignancy.

In this study 12 patients (26.66%) were well nourished, 16 patients (35.55%) were moderately nourished, and 17 patients i.e. 37.77% patients were poorly nourished according to NRI (Figure 4).

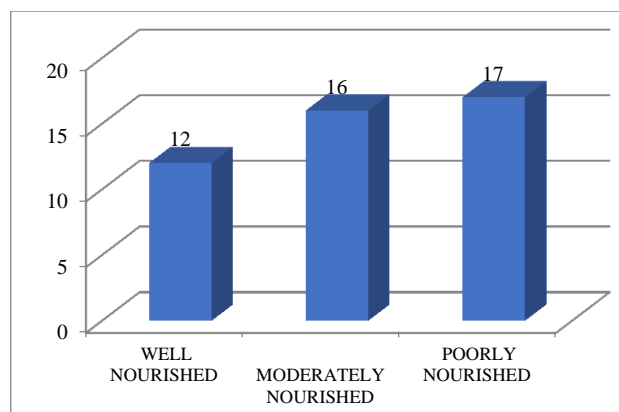


Figure 4: Distribution of cases according to nutritional status based on NRI.

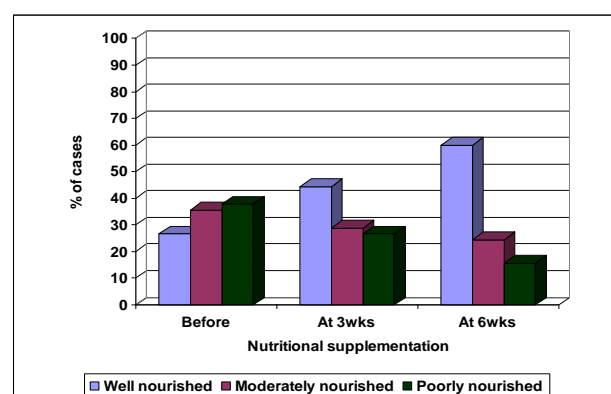


Figure 5: Improvement in nutritional status after nutritional supplementation at 3 weeks and 6 weeks in study group.

At end of 3 weeks chi-square value 41.70, $p < 0.0001$; at end of 6 weeks chi-square value 41.29, $p < 0.0001$.

There was statistically significant improvement in the nutritional status of the patients at the end of three weeks and at the end of six weeks after supplementation (Figure 5).

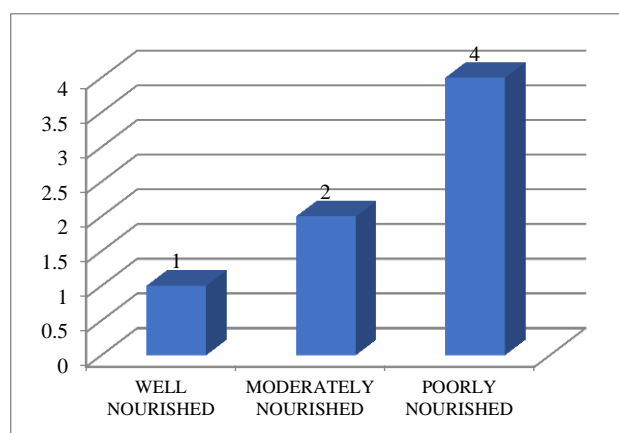


Figure 6: Patients with SSI.

Chi-square = 12.16, $p = 0.002$.

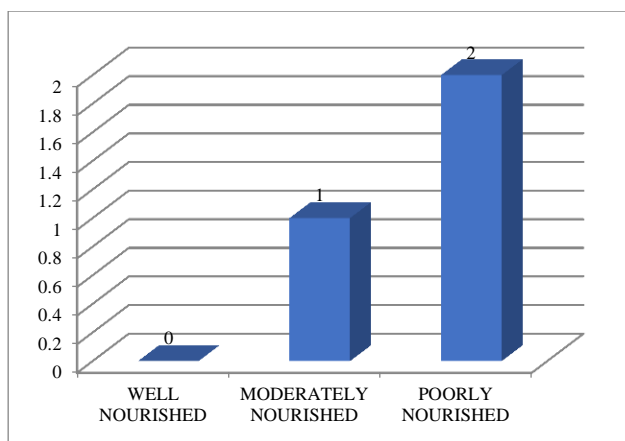


Figure 7: Patients with anastomotic leak.

Chi-square = 7.43, P=0.024.

SSI occurred in 7 patients in this study of which 4 (57.14%) were poorly nourished, 2 patients (28.57%) were moderately nourished, and 1 patient (1.42%) was well nourished, which was statistically significant (Figure 6).

Anastomotic leak occurred in 3 patients in this study, of which 2 (66.66%) patients were poorly nourished and 1 patient (33.33%) was moderately nourished, which is statistically significant (Figure 7).

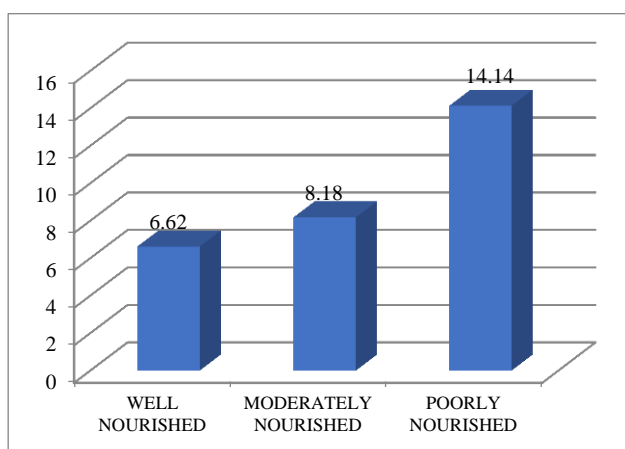


Figure 8: Average number of days of hospital stay.

Average number of days of hospital stay for well-nourished patients was 6.23, for moderately nourished patients was 8.18 and for poorly nourished patients was 14.14, which was statistically significant (Figure 8).

DISCUSSION

The study was conducted to assess the nutritional status of patients in gastrointestinal malignancy, assess impact of nutritional supplementation and study its impact on outcome of surgery with respect to surgical site infection, anastomotic leak and number of days of hospital stay.

Total 45 patients were enrolled in our study that fulfilled inclusion and exclusion criteria.

Incidence of gastrointestinal malignancy was maximum in the age group of 51-60 years i.e. 37.77%. Bozzetti et al noted in their study that age was mostly distributed in the range between 55 and 75 years but it is noteworthy that 33.6% of patients were over 65.¹¹ do Prado et al in their study found the mean age of participants was 57.45 (DP=9.62) years, with a minimum of 27 and maximum of 81 years, with 76.2% of the patients being of an age equal to or older than 50 years.¹²

In our study there were 25 male patients and 20 female patients. Garth et al studied a total of 95 patients of which 62 were male and 33 female.¹³ do Prado et al had 69.9% male patients and 30.1% female patients.¹²

In our study there were 29 cases of upper gastrointestinal malignancy and 16 cases of lower gastrointestinal malignancy with maximum number of cases of stomach and colorectal cancer and least of anal canal cancer. Bozzetti et al in their study of 149 patients had 96 cases of upper gastrointestinal malignancy and 53 cases of lower gastrointestinal malignancy which was similar to our study.¹¹ In a study by Garth et al, 95 surgical patients were identified as being eligible for inclusion. Of these patients, 37 were admitted to the upper GI unit and 58 to the colorectal unit which differed from our study.¹³

In this study 12 patients (26.66%) were well nourished, 16 patients (35.55%) were moderately nourished, and 17 patients i.e. 37.77% patients were poorly nourished according to NRI. Garth et al noted that patients admitted to the upper GI unit (n=9) were more likely to be malnourished compared to those admitted to the colorectal unit (n=16) which is similar to our study.¹³ There was statistically significant improvement in the nutritional status of the patients at the end of three weeks and at the end of six weeks after supplementation (p<0.0001).

Mahendran et al in a study of 56 patients noted that the biochemical parameter such as the serum albumin as well as nutritional parameters such as weight and BMI showed significant improvement in the group which received nutritional intervention.¹⁴

SSI occurred in 7 patients in this study of which 4 (57.14%) were poorly nourished, 2 patients (28.57%) were moderately nourished, and 1 patient (1.42%) was well nourished (p=0.002).

Fukuda et al concluded malnutrition, a risk factor for SSI, was prevalent in gastric cancer patients preoperatively. Well managed preoperative nutritional support decreased the incidence of postoperative SSIs in a malnourished patients.¹⁵

Anastomotic leak occurred in 3 patients in this study, of which 2 (66.66%) patients were poorly nourished and 1 patient (33.33%) was moderately nourished ($p=0.024$). Shukla et al anastomotic leak occurred in 2 patients of control group and no patient of group which received nutritional intervention.¹⁶

Average number of days of hospital stay for well-nourished patients was 6.23, for moderately nourished patients was 8.18 and for poorly nourished patients was 14.14, which was statistically significant ($p<0.001$). Garth et al patients who were malnourished preoperatively spent significantly longer in hospital compared to well malnourished patients [15.8 (12.8) days versus 7.6 (3.5) days; $p<0.05$].¹³

CONCLUSION

Malnutrition is a serious concern in gastrointestinal malignancies. Patients suffering from upper gastrointestinal malignancies are more prone for malnutrition than lower gastrointestinal malignancies. Delay in surgery, even upto 6 weeks is permissible in order to enhance patients' nutritional status. Proper nutritional supplementation over a period of 3 to 6 weeks helps significantly in improvement of nutritional status. Complications like surgical site infection, anastomotic leak are significantly reduced after improvement in nutritional status after nutritional supplementation. Average number of days of hospital stay also significantly reduces in well-nourished patients thus facilitating early return to work.

ACKNOWLEDGEMENTS

It gives me immense pleasure to express my deep sense of gratitude and sincere thanks to Dr. Daksahayani S. Nirhale, Professor, Department of General Surgery, Dr. D. Y. Patil medical College, Pimpri, Pune, whose practical guidance during the course of my study is without parallel. I would like to thank her for her dedicated professionalism, indefatigable efforts, cheerful guidance and constant encouragement during the course of my study. I take this golden opportunity to show my indebtedness to my institution, Dr. D. Y. Patil Medical College, Pimpri, Pune, where I sustained interest in my work constantly; and encouraged me to reach my goal. I wish to offer my acknowledgements to one and all whose individual mention is not possible here, but who have led their contribution towards successful completion of this study. Finally, my special thanks to all the patients without whom this study would not have been successful.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Angahar LT. An Overview of Breast Cancer Epidemiology, Risk Factors, Pathophysiology, and Cancer Risks Reduction. *MOJ Biol Med.* 2017;1(4):00019.
2. Sung J, Ng E, Lin JT, Ho K, Ji JF, Sugano K, et al. On behalf of the Asia Pacific GI Oncology Summit Group Digestive Cancer Management in Asia: Position Statements- a report on GI Oncology Summit in 2011. *J Gastroenterol Hepatol.* 2012;27:1417-22.
3. Gastrointestinal cancers. Available at: <https://www.gicancersalliance.org/resources/gastrointestinal-cancers-an-urgent-need/>. Accessed on 10 June 2017.
4. Available at: http://www.globocan.iarc.fr/Pages/summary_table_pop_sel.aspx. Accessed on 16 February 2016
5. WHO. Diet, nutrition and the prevention of chronic diseases. Report of a Joint WHO/FAO Expert Consultation. WHO Technical Report Series No. 916 World Health Organization: Geneva, 2003.
6. Argiles J. Cancer-associated malnutrition. *Eur J Oncol Nurs.* 2005;9:39-50.
7. Shils ME. Principles of nutritional therapy. *Cancer.* 1979;43(5):2093-102.
8. Petroniau A, Alberti LR, Zac RI, Andrade Júnior JCCG. Influência do trauma cirúrgico na concentração sérica de albumina no pós-operatório imediato. *Rev Col Bras Cir.* 2004;31(3):194-9.
9. Van Cutsem E, Arends J. The causes and consequences of cancer-associated malnutrition. *Eur J Oncol Nur.* 2005;9:51-63.
10. 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.
11. Bozzetti F, Gianotti L, Braga M, Carlo VD, Mariani L. Postoperative complications in gastrointestinal cancer patients: The joint role of the nutritional status and the nutritional support. *Clinical Nutr.* 2007;26:698-709.
12. do Prado CD, Campos JADB. Nutritional status of patients with gastrointestinal cancer receiving care in a public hospital, 2010-2011. *Nutr Hosp.* 2013;28(2):405-11.
13. Garth AK, Newsome CM, Simmance N, Crowe TC. Nutritional status, nutrition practices and post-operative complications in patients with gastrointestinal cancer. *J Human Nutrition Dietetics.* 2010;23:393-401.
14. Mahendran V, Shetty B. Effect of Nutritional Supplementation in Patients Undergoing Major Gastro-Intestinal Surgery. *IOSR J Dental Medical Sci.* 2017;16(3):5-7.
15. Fukuda Y, Yamamoto K, Hirao M, Nishikawa K, Maeda S, Haraguchi N. Prevalence of Malnutrition Among Gastric Cancer Patients Undergoing Gastrectomy and Optimal Preoperative Nutritional

Support for Preventing Surgical Site Infections. *Ann Surg Oncol.* 2015;22;778-85.

16. Shukla S, Songra MC, Patbamniya NK, Damor M, Tyagi V. Role of preoperative nutrition in gastrointestinal cancer patients: a prospective study. *Int Surg J.* 2017;4(1):131-3.

Cite this article as: Nirhale DS, Ghalsasi AA, Nisarga V. Assessment of nutritional status, pre-operative nutrition supplementation and its' impact on the outcome of surgery in gastrointestinal malignancies: a prospective study. *Int Surg J* 2020;7:178-83.