

Nutritional Status of Cancer Patients Using PG - SGA Screening Tool: An Observational Study

Radha V. Sista¹, Sujatha Stephen K.²

¹M. Sc, RD Intern, Yashoda Hospitals Malakpet, Hyderabad, Telangana, India

²M. Sc, RD, Chief Dietician, Yashoda Hospitals, Malakpet, Hyderabad, Telangana, India

Abstract: *Cancer is one such disease, which has a significant impact on the physical functioning, psychological well being and nutritional intake of a patients. The outcome of poor nourishment leads to increased risks of disease complications, reduced tolerance towards treatment, impaired quality of life and reduced life expectancy. Nutritional screening defines as the initial clinical evaluation that helps to identify patients who are susceptible to malnutrition. In view of above, the nutritional assessment of the oncology was done using PG - SGA for those who weresuffering from Head and Neck Cancer and Gastrointestinal Cancer who visited the hospital for radiation therapy and chemotherapy of Yashoda Hospitals, Malakpet Hyderabad were considered. The study was analysed as, maximum participants were suffering from Head and Neck Cancer either had social habits of tobacco chewing (47.4%) or smoking (10.5%). Due to the anticancer treatment, 84.2% participants had difficulty in swallowing as well as they had mouth sores which reduced to food intake as evidenced by symptoms the patients developed fatigue. Constipation (53.8%) was one of the major symptoms seen in GI cancers. The present study can be concluded that, nutritional status of patients influences the outcomes in oncology patients.*

Keywords: Head and Neck cancer, Gastrointestinal cancer, Malnutrition, PG - SGA screening tool, Nutrition

Malnutrition, according to World Health Organizations (WHO) is defined as deficiencies, excess or imbalance in a person's intake of energy and/or nutrients. ESPEN has defined Malnutrition as a state resulting from lack of nutrient intake and a result of it leading to altered body composition which shows decreased fat mass and muscle mass. A study conducted in 2008 by Soeters et al, have also included, malnutrition also leads to diminished functional ability and poor clinical outcomes.

Cancer is one of the chronic diseases which is a major global public health concern. In a study conducted by J. M. Angiles in 2005, estimated that over 2.9 million new oncology cases are being screened annually in the European Union. Various types of cancers like head and cancer, breast, lung, colorectal and prostate cancer are the most common forms in females and males respectively.

Patients with Head and Neck Cancer frequently present a history of tobacco chewing, excessive alcohol consumption and poor nutritional status, poor dietary intake often resulting from social, physical and financial effects of their dependency.

Malnutrition associated with cancer is a cause of imbalance between the nutritional needs of the patients, the tumour multiplication and the availability of nutrients stores in the body. Prolonged nutrition depletion and decreased intake results into cachexia which is a specific form of malnutrition seen in cancer patients. Cachexia is generally characterized by involuntary weight loss with depletion in muscle mass and fat mass, reduced immune response, edema and decline in motor and mental function. These progressive change in the body can be related with altered tastes and food aversions.

The etiology of cancer associated malnutrition is complex and cannot be described on the basis of poor nutrient intake alone, increasing oral intake alone is not sufficient to prevent

or revert malnutrition. Patients suffering from cancer, the malnutrition is also aided by the tumour and several other factors have been implicated in the pathophysiology of cancer cachexia.

In several studies, Patient Generated Subjective Global Assessment (PG - SGA) nutrition assessment screening tool had been used to assess the patient's body weight, presence of any medical signs and symptoms and to monitor the changes related to dietary intake (Wittenaar et al, 2011).

The purpose of this present observational study was to check the nutritional status of the patients before and after radiotherapy and chemotherapy in Head and Neck Cancer and GI Cancer patients.

Patients treated for head a neck cancer and GI cancer within the hospital setting of Radiation and Chemotherapy centre of Yashoda Hospitals, Malakpet, Hyderabad were chosen, who were willing to participate in the screening program study.

Diagnosis and treatment information were taken up from the patient's medical records. The location of tumour, type of cancer, date of start and end of the treatment were also collected.

The criteria for inclusion of study were, patients above the age of 20 years; primary or recurrent carcinoma of squamous cells in the region of tongue, buccal mucosa, larynx, esophagus, stomach, colon and rectum were considered for the study. Curative treatment with radiotherapy, either alone or in combination with post - surgery or chemotherapy was also considered.

Patients with co - morbidities like Diabetes Mellitus and Hypertension were included. Exclusion criteria for the present study was, patients with newly diagnosed cancer during the study period, metastasis of cancer, or known case

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of kidney or liver disease, patients susceptible to edema or ascites.

All the inclusion criteria patients received individual dietary counselling during the study period and on weekly basis during radiation therapy or chemotherapy. Dietary counselling encompassed advice on modification of the texture of food to eliminate treatment related symptoms like xerostomia, mucositis, swallowing difficulties, altered taste, nausea, diarrhoea, constipation and vomiting. The target of nutritional intervention was to meet 30 - 35 Kcal/Kg BW and 1.2 – 1.5 gm protein/Kg BW either orally or through tube feeding. The ONS was also added to the diet so as to meet the requirement of nutrients either post - surgery or during radiotherapy/chemotherapy or in post treatment period.

In 2010, a study was conducted by Wittenaar et al on changes in nutritional status and dietary intake during and after Head and Neck Cancer treatment, their study concluded that, despite giving nutritional support, patients failed to maintain or improve their nutritional status who are suffering from Head and Neck Cancer.

ESPEN experts did a survey on the nutritional status of patients undergoing cancer treatment. They found that although many advanced treatments have come in treatment of cancer but, the undernutrition remains unsolved in the patients (Arends et al, 2017)

Enteral Feeding is a very successful method of feeding to avoid usual symptoms which are noticed in Head and Neck Cancer. The Enteral Nutrition feeding improves tolerance level towards treatment, post - treatment morbidity, improves quality of life and decreases mortality (Alshadwi et al)

Luis and Aller (2007), in their study they discussed that increase in calorie and protein intake improved the outcome of oncologic treatments taken by Head and Neck Cancer. They also stated that enteral feedings supplemented with Arginine during the post - operative period improves the post - operative immunological status of the patient and also shows a quick recovery.

A study completed in 2013, revealed that reduced/decreased food intake and insufficient calorie protein prescription leads to rapid malnutrition in Head and Neck Cancer. The author also mentioned the risk of malnutrition is proportionally higher in patients with a history of alcohol abuse in men. (Figure - 1)

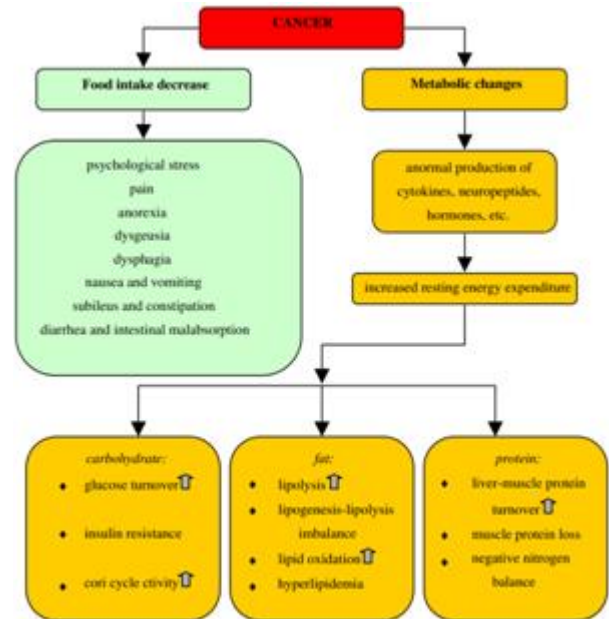


Figure 1: Etiology of body weight loss and metabolic abnormalities seen in cancer patients (Caro et al, 2007)

Julie Lees in 1997 mentioned in her study that, Nasogastric and Percutaneous Endoscopic gastrostomy feeding were found to be equally effective at maintaining body weight of Head and Neck patient receiving radical and palliative radiotherapy treatment.

Chemoradiation treatment, causes severe adverse effects like nausea, vomiting, mucositis, diarrhoea and gut disturbances which can impact the food consumption of the patients or sometimes abort the anti - cancer intervention, thereby resulting in decrease of overall survival (Pan et al, 2013).

In 2010 a study was conducted by Hill et al, they have discussed that malnutrition and weight loss are associated with a range of poor outcomes in GI cancer patients undergoing surgery and chemotherapy. Their study also indicated that deterioration in nutritional status may be associated with poorer short term treatment outcomes in GI cancer patients undergoing radiation therapy.

A study in 2006 found that, patients 31% were on radiation therapy who indicated malnourished. By the end of treatment, the percentage of malnutrition increased to 43% in head and neck cancer patients. 6 months follow up was made and the ratio of malnutrition decreased to 8%. Nutritional status of all groups was found to improve during the follow up period (Unsal et al).

Thirty - two patients were included in the present study (64% participation rate). The reasons for less participant percentage are, patients suffering from metastasis of cancer and other than head and neck or GI cancers were not included in the study. No significant difference was found in the type of cancer and BMI in the participants. The most common head and neck cancer was carcinoma of tongue (28%), followed by carcinoma of buccal mucosa (25%) whereas, the most common gastrointestinal cancer was carcinoma of rectum (15.60%), followed by colon cancer (12.5%).

The **Table - 1** depicts participants, suffering from type of cancer and belonging to the age category.

Table 1: Type of Cancer and Age Category

Social Habits	Head and Neck Cancer	GI Cancer	Chi Square
30- 40 years	4 (21%)	0 (0%)	5.938 ^(NS)
40-50 years	5 (26.3%)	1 (7.7%)	
50-60 years	6 (31.6%)	7 (53.8%)	
60 years & above	4 (21.1%)	5 (38.5%)	
Total	19 (100%)	13 (100%)	

NS- No Significance

The analysis concludes that there is no significant difference between the type of cancer and the age category. The maximum number of participants from both the cancer categories belonged to the age group of 50 – 60 years.

The **Table - 2** shows the relation between social habits and risk of cancer.

Social Habits	Head and Neck Cancer	GI Cancer	Chi Square
None	5 (26.3%)	12 (92.3%)	14.604 ^{**}
Tobacco Chewing	9 (47.4%)	0 (0%)	
Smoking	2 (10.5%)	1 (7.7%)	
Tobacco Chewing & Smoking	3 (15.8%)	0 (0%)	
Total	19 (100%)	13 (100%)	

** means p<0.02 indicating significance

In a study conducted by Marur and Forastiere (2008), stated that smoking and alcohol consumption are the most common risk factors observed in Head and Neck Cancer. Tobacco chewing adds 2 folds more risk for susceptibility to cancer. In the present study, it was analysed that, 47.4% participants from Head and Neck cancer group suffered either from carcinoma of tongue or buccal mucosa and had the history of chewing tobacco over a period of 15 – 20 years while, participants who had GI cancer were not having history related to social habits. Therefore, it is statistically concluded that there is a significant relation between social habit and cause of cancer.

The **Table - 3** shows the relation between comorbidities and risk of cancer –

Cancers & Comorbidities	Head and Neck Cancer	GI Cancer	Chi Square
Only Cancer	12 (63.2%)	5 (38.5%)	1.890 ^(NS)
Cancer with Comorbidities	7 (36.8%)	8 (61.5%)	
Total	19 (100%)	13 (100%)	

NS – No significance

In a study conducted by Smith and Gale in 2009, stated that insulin resistance may lead to cancer of colon, breast and pancreas. In the present study, there is no significant difference, in relation with cancer and comorbidities like Diabetes Mellitus or Hypertension.63.2% population of Head and Neck cancer patients reported no comorbidities, while 36.8% patients, suffered from either diabetes mellitus or hypertension. In GI Cancer, 38.5% patients were not having any comorbidities, while 61.5% patients reported comorbs.

The **Table – 4** shows the relation between symptoms caused due to cancer and cancer treatment –

Symptoms	Head and Neck Cancer	GI Cancer	Chi Square
Nausea	7 (36.8%)	6 (46.2%)	0.277 ^(NS)
Swallowing	16 (84.2%)	2 (15.4%)	14.85 ^{**}
Mouth sores	16 (84.2%)	1 (7.7%)	18.148 ^{**}
Dry mouth	13 (68.4%)	1 (7.7%)	11.567 ^{**}
Fatigue	15 (78.9%)	5 (38.5%)	5.398 ^{**}
Constipation	0 (0%)	7 (53.8%)	13.09 ^{**}
No Problem in Eating	3 (15.8%)	4 (30.8%)	1.013 ^(NS)

** shows p<0.02 indicating significance; NS – No significance

Patients receiving radiation therapy often complaint about swallowing difficulties, mouth sores and fatigue. In the present study, it was found that 84.2% population has difficulty in swallowing as well as they have mouth sores who are suffering from head and neck cancer. Due to reduced food intake as evidenced by symptoms, the patients also developed fatigue. Constipation (53.8%) was one of the major symptoms seen in GI cancers. Also, 46.2% patients had suffered from nausea.

Only, a very small population didn't find any difficulty in eating, as they had developed no signs or symptoms as part of cancer treatment.

Hence, in this present study it was analysed that there is 99% significant relation between symptoms which are part of cancer and cancer treatment which diminished the food intake of the patients.

The **Table – 5** shows the mode of nutrition in view of symptoms related to cancer and its treatment -

Food Intake	Head and Neck Cancer	GI Cancer	Chi - Square
Only Liquids	14 (73.7%)	5 (38.5%)	3.970 ^{**}
Enteral Nutrition	4 (21%)	4 (12.5%)	3.128 ^{**}
Oral - Less than Normal Intake	3 (15.8%)	9 (69.2%)	9.406 ^(NS)

** shows p<0.02 indicating significance; NS – No significance

In the present study it was analysed that, there is a significant relation between location of cancer, symptom caused by the cancer and its treatment and mode of nutrition.73.7% patients belonging to Head and Neck Cancer category, were taking only liquid diet due to various complaints like – mouth sores, swallowing difficulties, dry mouth etc. while, 4 patients out of 19 patients where, on Enteral Nutritional support, as they were severely malnourished accompanied by cancer related symptoms. Patients suffering from GI cancers, were able to take food orally (69.2%), which was suboptimal to their usual intake. Whereas, 12.5% patients were on Enteral Nutrition support and 38.5% patient were on liquid diet because of nausea, swallowing difficulties and abdominal pain after taking food as reported by the patients.

The – **Table 6** represents the activity associated with cancer

Activity	Head and Neck Cancer	GI Cancer	Chi Square
Normal with no limitation	3 (15.8%)	4 (30.8%)	2.186 ^(NS)
Not my normal self but able to be up with fairly normal activities	9 (47.4%)	3 (23.1%)	
Able to do little activity and spend most of the day in bed or chair	1 (5.3%)	1 (7.7%)	
Pretty much bed ridden	6 (31.6%)	5 (38.5%)	

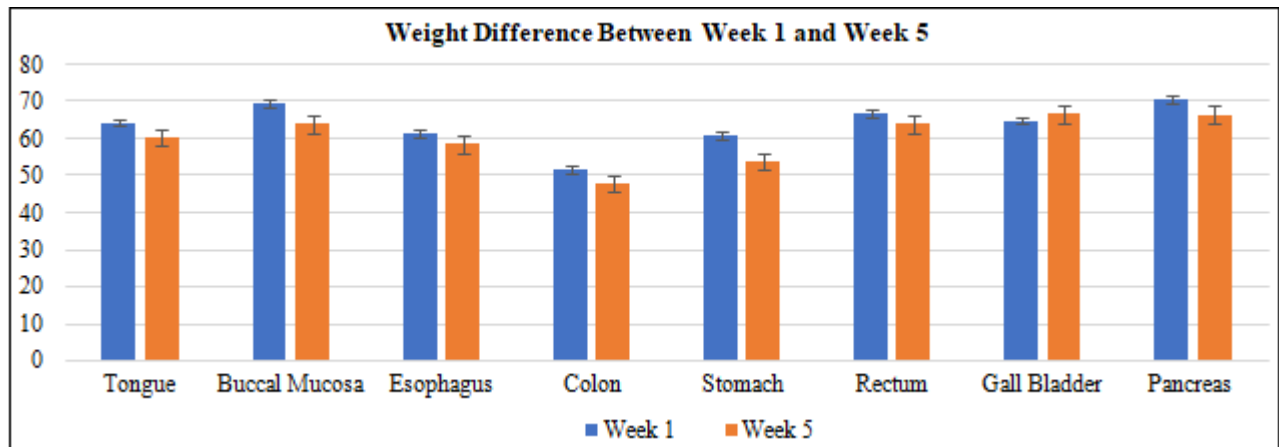
NS – No significance

The statistical analysis represents, that there is no significant difference between type of activity and cancer. Patients who are mostly bed ridden, is either due to low nutritional status, or due to elderly age in both the cancer category. Whereas, patients who were coping up with the treatment didn't show any self - limitations in their activity rather, they were able to do little work for themselves.

The - **Table 7** indicates the weight difference at the start of the treatment and at the end of the treatment

Location of Tumour	Week 1	Week 5	% Of Weight Loss
Tongue	64.48 ± 10.6	60.51 ± 11.2	6
Buccal Mucosa	69.66 ± 18	63.96 ± 16.56	8
Esophagus	61.63 ± 16.94	58.7 ± 15.1	5
Colon	51.75 ± 9.65	48.12 ± 6.14	7
Stomach	61 ± 0	54 ± 0	11
Rectum	67.02 ± 0	64.08 ± 14.51	4
Gall Bladder	65 ± 0	66/7 ± 0	4
Pancreas	70.9 ± 0	66.6 ± 0	6

Blum et al (2011) in his study stated that, majority of cancer patients experience involuntary weight loss which can be due to, anorexia, psychological distress and decreased physical functioning. In the current study, weights of the individual patient were marked at the start of the treatment and weekly once the patient's weight was assessed. In Table - 7, weights of the patients at Week 1 i. e., at the beginning of the radiation therapy and Week 5 i. e., at the end of the treatment are classified according to based on the presence of tumour.



Graph 1: Represents the average weight difference at Week 1 and Week 5 of the treatment and are classified according to the tumour location.

Unintentional weight loss in cancer patients has been reported. According to a study report, decreased oral intake secondary to anorexia is a common cause of unintentional weight loss in cancer patients as shown in Graph - 1. (Mattox, 2005).

Nutritional status of patients influences the outcome in cancer patients. Gradual loss of weight is commonly observed in many cancer patients. As per the global statistics 30 to 85% cancer patients are malnourished who are

suffering from Gastrointestinal related cancers. Cancer cachexia encompasses of anorexia, early satiety, depletion of skeletal muscle and subcutaneous fat stores, muscle weakness, fatigue, decreased immunity, reduced mobility and reduced psycho – social interest. Often, patients with cancer cachexia have pale appearance and wasted face. To addition of it, they also develop taste changes and experience food aversions which progress to reduced food intake. (Argiles, 2005; Leathwood et al, 1986: Fearon, 1992).

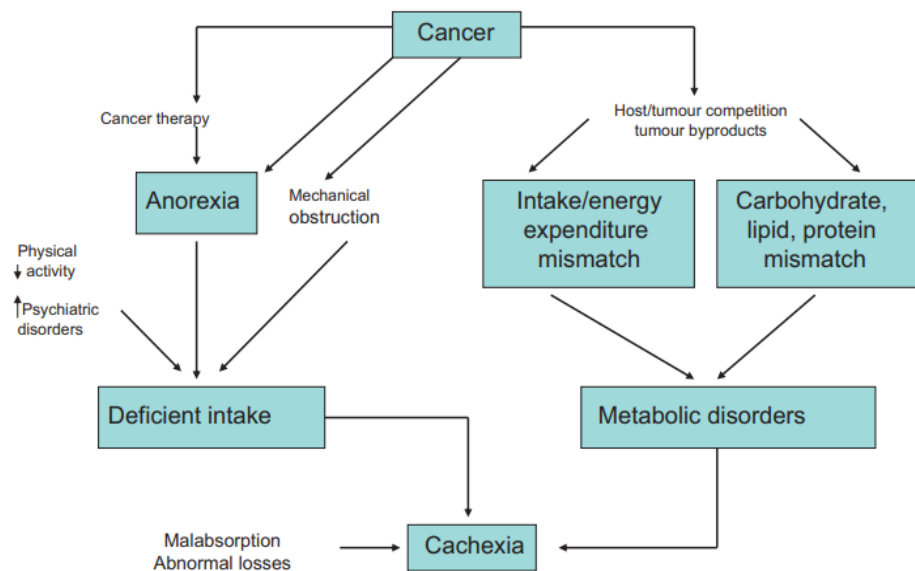


Figure 2: Etiology of malnutrition in Cancer Patients (Righini et al, 2013)

The present study is one of the few studies that was performed with use of PG - SGA nutritional assessment scoring, where patients of Head and Neck Cancer and Gastrointestinal Cancers were included. Patients in the present study were unable to maintain their weights as well as lean body mass which was being depleted during anti - cancer treatment. The loss of body weight and lean mass are an indication of negative energy and nitrogen balance. This could be an outcome of the decreased food intake and symptoms associated with treatment as shown in Table – 4 and Table – 5. The individual dietary recommendation of 35 Kcal/Kg body weight and 1.3 gm of protein/Kg body weight was taken into consideration, unfortunately the body weight or lean mass couldn't be preserved during treatment. It may be assumed that patients with Head and Neck cancer and Gastrointestinal cancer are subjected to intensive treatment which results into restricted physical activity or strenuous activity but remained bed ridden or ambulatory as shown in Table - 6.

The tumour and anticancer treatments both collectively give rise to decreased nutritional intake and abnormal metabolism which contribute to the pathogenesis of malnutrition (Figure - 2) (Argiles et al, 2003; Tisdale, 2003).

Foltz et al (1996), stated that food consumption was reduced due to the complication as mentioned in the present study like mouth sores, swallowing difficulties, dry mouth, etc. lead to reduced appetite as well as obstruction in nutrient absorption. Food intake and nutrient absorption may also be affected as a result of radiation therapy, chemotherapy and surgery which damages the salivary glands, villi on small intestines and motility of stomach as well as of the colon (Epstein et al, 1999).

Conclusion

The present study is concluded as, malnutrition in cancer differs from simple starvation, being associated with loss of lean body mass and muscle wasting, ultimately resulting in cachexia. Cancer associated malnutrition is a multifactorial condition wherein both tumour and host derived factors have

been implicated in its pathogenesis. Malnutrition adversely affects patient's outcome. Early intervention by providing nutritional support can help to delay or prevent the onset of malnutrition and improve patient's outcomes.

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