Assessment of Nutritional Status and Change in Lean Body Weight in Head & Neck Cancer Patients Undergoing Radiotherapy

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ABSTRACT

Introduction: The incidence of malnutrition among cancer patients has been estimated at between 40 and 80%. Malnutrition is a common problem in patients with Head and Neck Cancer. During treatment (Radiotherapy alone or combined with chemotherapy or surgery) malnutrition may develop or aggravate lean body weight due to treatment toxicity in Head and Neck Cancer.

Aim: To assess the nutritional status and change in Lean Body Weight (LBW) in patients with Head & Neck Cancer undergoing Radiotherapy.

Materials & Methods: Nutritional status and change in LBW of 47 Head and Neck Cancer patients were assessed using PG-SGA tool and Durnin & Womersley equation, respectively, in week before and after Radiotherapy.

Results: Mean age was 50.68 years. Scored PG-SGA identified 78.72 % (37/47) of patients as requiring active (20/47) or critical (17/47) nutritional intervention. After treatment 97.4 % (46/47) patients were identified as having need for active or critical nutritional intervention. Mean PG-SGA Score before and after the treatment was 7.28 vs 11.02 (p=0.0001), respectively, indicating statistically significantly worsening of nutritional status. During treatment, total body weight (- 4.32±4.13kgs; p= 0.0001) and LBW (- 2.03 ±2.34kgs; p= 0.00012) significantly declined with LBW representing 47% of total weight loss. There was a trend for higher LBW loss in moderately or severely malnourished patients. Decline in LBW didn't reach statistical significance (p = 0.34) across the SGA classes (A, B & C) indicating global decline in LBW irrespective of pretreatment SGA classification.

Conclusion: Patients with Head & Neck Cancer fail to maintain nutrition status during treatment and results in significant decline in body weight & LBW. Chemo-radiation in such patients should combine nutrition with activities to support lean tissue anabolism.

Key words: Head and Neck Cancer, Malnutrition, PG-SGA, Lean Body Weight, Radiotherapy.

INTRODUCTION

The incidence of malnutrition among cancer patients has been estimated between 40-80%.[1] Cancer cachexia has been implicated in the deaths of 30–50% of all cancer patients.[2] Malnutrition is a common problem in patients with head and neck cancer. During treatment (Radiotherapy alone or combined with Chemotherapy) malnutrition may develop or aggravate as a result of reduced dietary intake due to treatment-related oral symptoms, such as chewing and swallowing problems, pain, drymouth, sticky saliva, taste disturbances and chemo-radiation-induced mucositis.[3] In malnourished patients, lean body mass reduction results in decreased physical activity, decline in quality of life, poor response to cancer treatment and prolonged duration of hospital stay.[4]

Increased need to recognize malnutrition at earliest has led to development of subjective global assessment (SGA) and further adaptation to Patient Generated- Subjective Global Assessment (PG-SGA).[5,6] It is a noninvasive, easily reproducible & fairly accurate tool to identify malnutrition in cancer patients.

Lean Body Weight (LBW) is normally defined to be the body weight minus the body fat. Typically lean body mass is 60-90% of the total body mass. Normally, men have higher port of lean body mass than women. There are many non-invasive methods to estimate Lean Body Weight in adults. Magnetic Resonance Imaging, Dual-energy X-ray absorptiometry (DXA) and Bioelectrical Impedance Analysis are precise but expensive and less commonly available tools for Lean Body Weight measurement.[7] Among affordable methods for measuring body fat percentage, using a skin-fold caliper is very accurate for most people and the four site formula by Durnin and Womersley calculation is considered valid for people between 17 and 68 years old.[8]

AIMS AND OBJECTIVES

The purpose of this study was to assess the nutritional status using PG-SGA and Lean Body Weight pre and post treatment (Radiotherapy, either alone or combined with Chemotherapy) in patients with Head & Neck cancer.

MATERIAL AND METHODS

Forty seven histo-pathologically proven Head and Neck Cancer patients presenting to the OPD of Radiotherapy Department from December 2012 to April 2014 for radical intent treatment with Radiotherapy alone or with Chemotherapy, were included in this study.

The inclusion criteria consisted of the following: serum creatinine <2.0 mg/dL; serum bilirubin <2.0 mg/dL; serum glutamic-oxaloacetic transaminase (SGOT) or serum glutamic-pyruvic transaminase (SGPT) less than or equal to three or more times the upper limits of normal; absolute neutrophil count >1,500/mm³; Hb> 10 gm%; platelets > 1 Lakh/mm³.

Patients with head and neck cancer not fit to receive Radical Radiotherapy, previous history of Radiotherapy or Chemotherapy, HIV Positive, COPD patients and patients on ATT were excluded from the study.

Nutritional status was assessed using PG-SGA tool in week before and after treatment (on last day). Changes in LBW too were assessed pre and post treatment. LBW was calculated from Body Fat % which in turn was derived from 4- site (triceps, biceps, subscapular and suprailiac) skin fold thickness using Harpenden Skinfold Caliper and using Durnin and Womersley equation for different age groups and sexes.

The study was approved by the Institutional Ethical Committee and informed written consent was obtained from each patient.

A Radical Radiotherapy dose of 64-70Gy/32-35F was given over a period of 7-8 weeks on a Varian Clinac 2100CD with 3D-CRT or conventional planning. The suitable patients were given concomitant chemotherapy with weekly cisplatin 35 mg/m².

STATISTICAL ANALYSIS

The data obtained was analysed using Microsoft excel 2013. The observations were expressed in appropriate tabular and graphical forms. The tests of significance were applied using SPSS version 21.

Quantitative data were analysed using means and standard deviations. Subgroups were analysed using ANOVA. The correlations were made using Pearson's "r" test. P value ≤0.05 at 95% confidence interval was taken as significant.

Table 1: Patient Characteristics (N=47)

Variable	Mean±SD
Age (yrs)	50.68±13.05
M: F	8: 1
Rural/Urban Status (%)	63/37
Patient Habits (%)	
Smokers	40
Alcoholic	29
Gutkha chewer	21
SE Status (%)	
Lower & lower middle	69
Nature of Complaint (%)	
Nutritional impact symptoms	75
Cancer Site (%)	
Oral Cavity	24.5 (12)
Oropharynx	51 (24)
Hypopharynx	8.5 (4)
Nasopharynx	02 (1)
Larynx	13 (6)
Cancer Stage	
Stage I	03
Stage II	17
Stage III	16
Stage IV	11
Modality of Treatment (%)	
CCRT	87 (41)
Only RT	13 (6)
Hemoglobin (g/dl)	11.76 ±1.96

RESULTS

Table 1 shows the demographic profile of the patients. Mean age was 50.68 years. Site wise distribution was as: Oropharynx- 51% (24/47), Hypopharynx- 8.5% (4/47), Nasopharynx- 2% (1/47), Larynx- 13% (6/47) and Oral cavity- 24.5% (12/47). Stage wise (I:II:III:IV) distribution was 3:17:16:11 respectively. Eighty seven percent patients (41/47) received Chemo-radiation (CCRT) and rest received Radiotherapy alone; three patients were candidates for Post-op CCRT. Median duration of treatment was 8 weeks. According to SGA classification pre-treatment 34% (16/47) patients were well-nourished (SGA-A) and prevalence of suspected moderate and severe malnutrition (SGA-B&C) was 66% (31/47). Scored PG-SGA identified 78.72 % (37/47) of patients as requiring active (20/47) or critical (17/47) nutritional intervention. After treatment 97.4 % (46/47) patients were identified as having need for active (17/47) or critical (29/47) nutritional intervention as shown in Table 2. Mean PG-SGA Score pre and post treatment was 7.28 vs 11.02, respectively, indicating worsening of nutritional status which was found to be statistically significant (p=0.0001). After treatment, statistically significant reduction in body weight (4.32±4.13kgs; p= 0.0001) and LBW (2.03 ±2.34kgs; p= 0.00012) was noted with LBW representing 47% of total weight loss (Figure- 1). There was a trend of higher LBW loss in moderately or severely malnourished patients. Decline in LBW didn't reach statistical significance (p = 0.34) across the SGA classes (A, B & C) indicating global decline in LBW irrespective of pretreatment SGA classification.

Table 2: Nutritional Triage Using Scored PG-SGA

% (n)	No active Intervention SGA-A	Active Intervention SGA-B&C	Critical Need for Intervention SGA-C	Mean PG-SGA Score
Before Treatment	21.3 (10)	78.7 (37)	36.17 (17)	7.28±3.77
After Treatment	2.2 (1)	97.8 (46)	61.7 (29)	11.02±4.83
		P <0.0001		

Figure 1: Total & Lean Body weight and its change during treatment
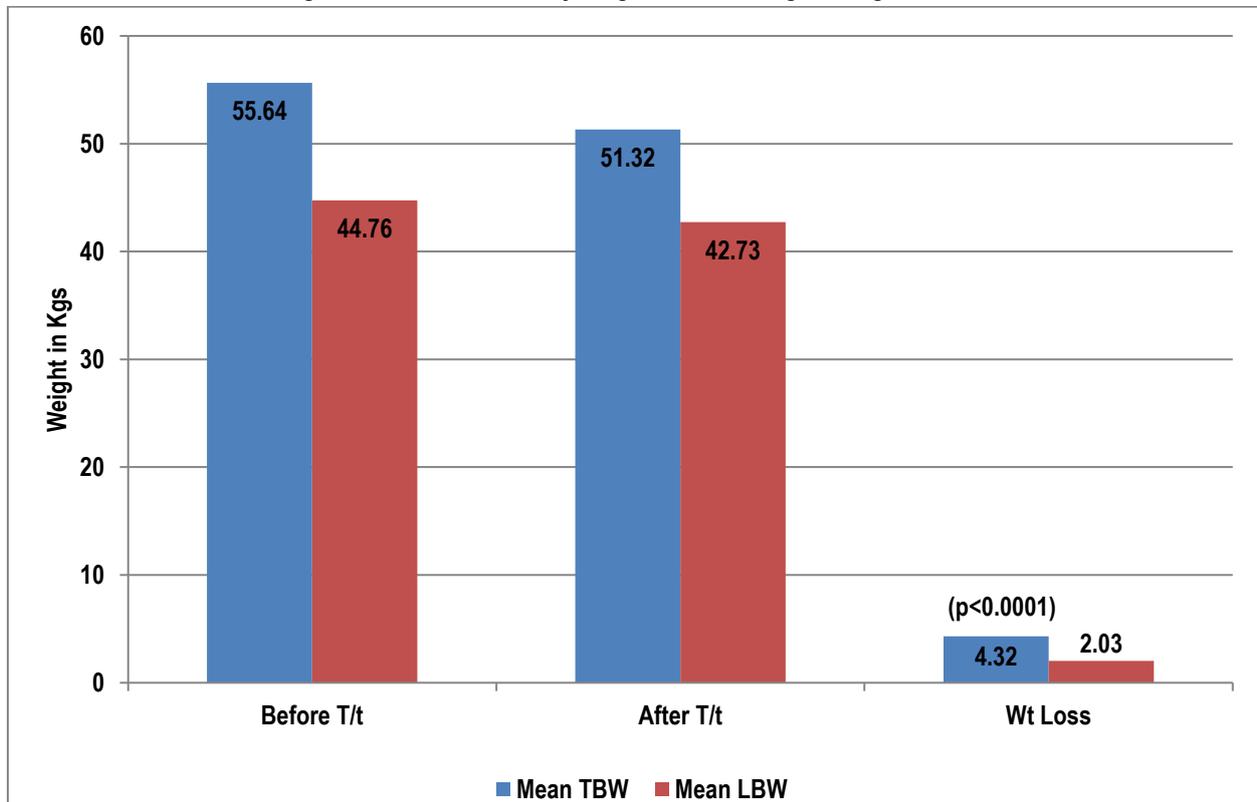
DISCUSSION

Malnutrition has been recognized as a poor prognostic indicator for cancer treatment-related morbidity and mortality in general, and it is reported to affect 30-80% of all patients with cancer.[9] In one study it was reported to be present in 49% of Head and Neck Cancer patients at presentation.[10]

In this study, 78.7% patients were malnourished using SGA categoristation. The probable reason might be the nutrition impacts symptoms these patients experience and the already existing malnourishment due to poor socio-economic factors. This shows that in this region of the country Head and Neck Cancer patients tend to have more malnourishment than other countries. Because of expected toxicities of chemoradiotherapy, 30% patients further become malnourished or their severity of malnourishment worsens.[11] In our study about 97% has moderate or severe malnourishment on the last day of treatment which is in tune with toxicity impact of chemoradiation.

Scored PG-SGA is a validated tool for nutritional assessment in cancer patients.[6,12] The mean PG-SGA-score was 7.28 indicating that most patients were in need for active nutritional intervention right from the start of treatment. On last day of treatment the PG-SGA was more than 11, indicating worsening nutritional status and the need for critical nutritional intervention.[13] There was good correlation of PG-SGA score with worsening nutritional status.[14]

Weight loss in Head and Neck Cancer patients is significantly associated with poor outcome and poor quality of life. More than 10% weight loss during radiotherapy is an independent factor for worsening Quality of life.[15] In our study the mean weight at start of treatment was 55.64 kgs and there was mean loss of 4.32 kgs(-4.32±4.13kgs; p= 0.0001) during radical Radiotherapy. The loss was significant. Though the mean loss was less than 10% but there was an unanalyzed set of patients who has more than 10% weight loss and may mean poor quality of life or even poor outcome. This is one of the limitations of the study. Ottosson et al reported a weight loss of 11.3% (± 8.6%) during the acute phase of Radiotherapy in Head and Neck Cancer patients.[16]

The estimated mean LBW was 44.76 kgs at start of treatment and 42.73 kgs at end of treatment, with a mean LBW loss of 2.03 kgs (- 2.03 ±2.34kgs; p= 0.00012). During treatment, total body weight and lean body weight significantly declined. The mean LBW loss was corresponding to mean TBW loss. Lean body weight loss has been associated with increased rate of infections and prolonged hospital stay and worsening quality of life.[4] The LBW loss represented about 47% of TBW which can be a concern and be maintained with nutritional intervention. Silver et al reported a LBW loss of upto 71.7% in Head and Neck Cancer patients undergoing chemoradiotherapy.[17]

Our study patients show that though they had higher incidence of malnourishment before start of treatment, has moderate loss of TBW and LBW with lean body weight mildly conserved. There was a trend for more Lean Body weight loss in moderately or severely malnourished patients but it didn't reach statistical significance (p = 0.34) indicating global decline in lean body weight irrespective of pretreatment SGA classification. The results reported by Capuano et al showed a strong correlation between involuntary weight loss and PG-SGA.[18] This tool has often been correlated with various prognostic criteria, including quality of life, especially in head and neck cancers.

There are some limitations to the study, we have not analysed the TBW and LBW loss as per the less than 5% weight loss or > 10% weight loss. The technique used for LBW estimation was a simple non-invasive method which may not be precise.

CONCLUSION

Patients with Head & Neck Cancer have a high incidence of malnourishment at presentation which can be assessed with PG-SGA. Head and Neck Cancer patients fail to maintain nutritional status during treatment and this leads to significant decline in total body weight & LBW. Chemo-radiation in such patients should be combined with adequate nutritional supplementation to support lean tissue anabolism.

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