Assessment of the nutrition using Scored Patient-Generated Subjective Global Assessment (PG-SGA) in 60 patients of Locally Advanced Head and Neck Carcinoma patients (LAHNC) treated with concomitant chemo-radiation.

Dr Ashutosh Sharma[1], Dr Karun Kamboj[2], Dr Anbu C[3], Dr Tarun Kumar[4], Dr Anoop Goel[5]

[1]Medical officer, Mukund Lal District Hospital, Yamuna Nagar Haryana, India
[2]Senior resident, Department of Radiation Oncology, AIIMS, New Delhi, India
[3]Consultant Radiation Oncologist, Ashwin hospital, Coimbatore, Tamil Nadu, India
[4]Senior resident, Department of Radiation Oncology, AIIMS, New Delhi, India
[5]Medical officer, Mukund Lal District Hospital, Yamuna Nagar Haryana, India

Corresponding author: Dr. Karun Kamboj, Senior resident, Department of Radiation Oncology, AIIMS, New Delhi, India. Email: karunkamboj04@gmail.com

ABSTRACT

Background: The present study aimed to assess the frequency of components of Scored Patient-Generated Subjective Global Assessment (PG-SGA) in locally advanced head and neck carcinoma patients (LAHNC) treated with concomitant chemo-radiation. **Materials & methods:** The present study was conducted on 60 previously untreated, histopathologically proven patients of locally advanced head and neck carcinoma who received conventional radical external beam radiation therapy (66Gy / 33 fractions over 6.3 weeks / 2 Gy per fraction) concomitant with Inj. Cisplatin 75mg/m2, 3 weekly. The frequency of components of the Scored Patient-Generated Subjective Global Assessment (PG-SGA) was assessed at the time of presentation, at the end of treatment and three months after completion of treatment. **Results:** The percentage of patients complaining of loss of appetite at the end of CCRT are significantly (p =0.01) higher than the percentage of patients having loss of appetite before CCRT. A decrease in throat pain at the 3rd month of follow up is significant (p = 0.008). At the end of CCRT, significantly (p ≤ 0.001) higher patients were taking less than usual food and this food intake increased (P≤ 0.001) in the 3rd month after completing CCRT. The number of patients with normal activities significantly (P ≤ 0.001) decreases at the end of CCRT and then increases significantly (p = 0.028) at 3rd month of follow up. At the end of CCRT, the percentage of patients with fairly normal activities decreased significantly (p = 0.016). There is a significant (p =0.017) increase of patients with a moderate deficit and there is also a significant (p=0.001) decrease of patients without deficit at the end of CCRT. Loss of body weight ≥ 5% at the end of CCRT is significant (p = 0.001) then this ≥ 5% weight loss significantly decreases at the 3rd month of follow up. The gain in weight at the 3rd month of follow up is significant (p =0.0004). **Conclusion:** The outcomes of this study provide a unique patient viewpoint of using the PG-SGA valuable input for the use of assessing nutrition in the patients receiving concomitant chemoradiation.
Keywords: cancer, head and neck, concomitant chemo-radiation, frequency and components, scored patient-generated subjective global assessment.

INTRODUCTION

Malnutrition has been defined as a sub-acute or chronic state of nutrition in which a combination of undernutrition (insufficient food intake) and inflammation has led to a decrease in muscle mass and fat mass, and diminished immune function, cognitive function, and muscle strength.[1].

In the period before treatment, a major cause of malnutrition in head and neck cancer is insufficient food intake, related to mechanical obstruction of food or pain related to the tumour[1]. Systemic effects of the tumour may also be responsible for decreased oral intake due to changes in taste or appetite, nausea and vomiting [2, 3]. During and after treatment, malnutrition in head and neck cancer may develop or aggravate as a result of decreased oral intake due to treatment-related side effects. [4]. Impaired oral intake is the main reason for unintentional weight loss and lowers physical activity in head and neck cancer patients [5, 6]. Weight loss may promote functional weakness and reduced physical activity [7, 8, 9]. Progressive muscle wasting, oedema, and decline in physical activity are also noted at the time of diagnosis of head and neck cancer[10]. Furthermore, chemo-radiation induces inflammation resulting in muscle wasting which in turn is associated with reduced physical activity [1, 11, 12, 13]. Parameters for adult malnutrition are insufficient energy intake and symptoms that may negatively influence food intake, weight loss, loss of muscle mass, loss of subcutaneous fat, localized or generalized fluid accumulation and diminished functional status [14].

Currently, the only nutrition screening tool for assessing parameters of malnutrition is the Patient-Generated Symptom Global Assessment (PG-SGA). The PG-SGA calculates a composite nutritional score after combining information from weight change, food intake, symptoms that may negatively influence food intake, performance status i.e. activities and function and physical examination of fat, muscle, & fluid status.The present study was planned to assess the frequency of components of Scored Patient-Generated Subjective Global Assessment (PG-SGA) in locally advanced head and neck carcinoma patients (LAHNC) treated with concomitant chemo-radiation.

MATERIAL AND METHODS
The study was conducted on 60 previously untreated, histopathologically proven patients of squamous cell carcinoma of the Head and Neck. The patients were staged according to the American Joint Committee on Cancer 2010 staging system. Sixty patients of locally advanced head and neck carcinoma received conventional radical external beam radiation therapy (66 Gy / 33 fractions over 6.3 weeks / 2 Gy per fraction) concomitant with Inj. Cisplatin 75mg/m2, 3 weekly, were assessed for frequency of components of Scored Patient-Generated Subjective global assessment (PG-SGA) at time of presentation, at the end of treatment and three months after completion of treatment. The Scored PG-SGA tool had seven questionnaires. The first four were completed by the patient him/herself or assisted as per information provided by the patient. These included weight changes, food intake, symptoms, activity and function. Questionnaire 5, 6 and 7 included diseases and their relation to nutritional requirements, metabolic demand and physical examination was completed by the clinical examiner
Statistical Analysis
Data were analysed using Statistical Package for Social Sciences (SPSS) for Windows version 16.0. Z-test for proportions was used to evaluate the difference in 2 proportions. Qualitative data was present as ratio and proportion. The point of statistical significance was taken when $p<0.05$.

RESULTS AND DISCUSSION
1.1Symptoms
Table no-1 shows symptoms related to the food intake of patients. The most common symptom for the reduction in food intake before CCRT, at the end of CCRT and at 3rd month of follow up

was pain in the throat the (31.67%), no appetite (28.34%) and problem in swallowing(23.33%) respectively.

Approximately 28% of patients complain of loss of appetite at the end of CCRT, which is significantly (p value=0.01) higher than 10% of patients having loss of appetite before CCRT.

There is a significant(p value= 0.008) decrease in throat pain at 3rd month following CCRT.

Only 3.33% of patients have no problem in feeding at the end of CCRT, which is significantly (p value= 0.001) lower than 28.34% before starting CCRT.

Kurak et al in their study reported that the frequency of symptoms related to reduced food intake before treatment in head and neck cancer were a pain in the throat followed by dysphagia, anorexia, mouth sores etc [15].

In the period before treatment, a major cause of malnutrition is insufficient food intake, related to mechanical obstruction of food or pain caused by the tumour [1].

Jager-Wittenaar observed in their study that during and after treatment, malnutrition may aggravate as a result of treatment-related oral symptoms, such as swallowing, pain, hyposalivation and taste disturbances and out of all oral symptoms, only swallowing problems were significantly related to malnutrition in the period after treatment for oral/oropharyngeal cancer [16,17].

Table 1

Symptoms	Before CCRT No of patients (%)A	At end of CCRT No of patients (%)B	At 3rd month of follow up No of patients (%)C	P value
No appetite	6(10%)	17(28.34%)	11(18.33%)	A-B=0.011, B-C=0.196, C-A=0.192
Pain in throat	19(31.67%)	13(21.66%)	7(11.7%)	A-B=0.217, B-C=0.145, C-A=0.008
Problem in swallowing	16(26.67%)	14(23.33%)	14(23.33%)	A-B=0.674, B-C=1.00, C-A=0.674
Mouth sores	1(1.66%)	4(6.67%)	1(1.66%)	A-B=0.172, B-C=0.172, C-A=1.00
Vomiting	0	5(8.33%)	0	A-B=NA, B-C=NA, C-A=NA
Loss of taste	0	4(6.67%)	2(3.33%)	A-B=NA, B-C=0.403, C-A=NA
Dry mouth	0	0	3(5%)	A-B=NA, B-C=NA, C-A=NA
Nausea	0	1(1.66%)	1(1.66%)	A-B=NA, B-C=1.00, C-A=NA
No problem in eating	17(28.34%)	2(3.33%)	20(33.33%)	A-B=<0.001, B-C=<0.001, C-A=0.556
Others	1#(1.66%)	0	1*(1.66%)	A-B=NA, B-C=NA, C-A=1.00
CCRT=Concomitant chemo radiation, #= difficulty in chewing , * = restricted mouth opening				

Table 2

Food intake	Before CCRT No of patients (%)**A**	At end of CCRT No of patients (%)**B**	At 3rd month of follow up No of patients (%)**C**	P value
Unchanged	19(31.67%)	1(1.67%)	6(10%)	A-B=<0.001, B-C=0.052, C-A=0.0036
More than usual	3(5%)	1(1.67%)	19(31.67%)	A-B=0.311, B-C=<0.001, C-A=0.0002
Less than usual	38(63.33%)	58(96.66%)	35((58.33%)	A-B=<0.001, B-C=<0.001, C-A=0.576

Table 3

Activities and function	Before CCRT No of patients (%)A	At end of CCRT No of patients (%)B	At 3rd month of follow up No of patients (%)C	P value
Normal with no limitation	17(28.34%)	1(1.66%)	7(11.67%)	A-B=<0.001, B-C=0.028, C-A=0.023
Fairly normal activities	31(51.67%)	18(30%)	21(35%)	A-B=0.016, B-C=0.560 C-A=0.066
Less than half of day in bed/chair	11(18.33%)	11(18.33%)	8(13.33%)	A-B=1.00, B-C=0.455, C-A=0.455
Most of day in bed/chair	1(1.66%)	22(36.67%)	19(31.67%)	A-B=<0.001, B-C=0.565, C-A=<0.001
Pretty much bedridden	0	8(13.34%)	5(8.33%)	A-B=NA, B-C=0.379, C-A=NA

Table 4

Physical examination	Before CCRT No of patients (%)	At end of CCRT No of patients (%)	At 3rd month of follow up No of patients (%)	P value
No deficit	18((30%)	4(6.66%)	6(10%)	A-B=0.001, B-C=0.509, C-A=0.0064
Mild deficit	21(35%)	17(28.34%)	19(31.67%)	A-B=0.434, B-C=0.691, C-A=0.700
Moderate deficit	21(35%)	34(56.66%)	30(50%)	A-B=0.017, B-C=0.466, C-A=0.097
Severe deficit	0	05((8.33%)	05(8.33%)	A-B=NA, B-C=1.00, C-A=NA

Table 5

Weight change	Before CCRT No of patients (%)	At end of CCRT No of patients (%)	At 3rd month of follow up No of patients (%)	P value
Weight loss between 0-1.9%	36(60%)	07(11.67%)	17(28.34%)	A-B=<0.001, B-C=0.023, C-A=0.0005
Weight loss between 2-2.9%	05(8.33%)	01(1.66%)	07(11.67%)	A-B=0.094, B-C=0.0286, C-A=0.543
Weight loss between 3-4.9%	06(10%)	09(15%)	10(16.66%)	A-B=0.409, B-C=0.804, C-A=0.285
Weight loss between 5-9.9%	04(6.67%)	21(35%)	08(13.33%)	A-B=<0.001, B-C=0.0058, C-A=0.225
Weight loss 10% or greater	02(3.33%)	20(33.34%)	02(3.33%)	A-B=<0.001, B-C=<0.001, C-A=1.00

| Weight gain | 07(11.67%) | 02(3.33%) | 16(26.67%) | A-B=0.084, B-C=0.0004, C-A=0.037 |

1.2) Food Intake

Table-2 shows the food intake of all 60 patients before CCRT, at the end of CCRT and at the 3rd month of follow up. Less than usual food intake was observed in 63.33% before CCRT, 96.66% of patients at the end of CCRT and 58.33% of patients at the 3rd month of follow up. More than usual food intake was observed in 5% of patients before CCRT, 1.67% of patients at the end of CCRT and 31.67% of patients at the end of CCRT.

At the end of CCRT, significantly (p-value≤ 0.001) higher patients (96.66%) were taking less than usual food and this food intake increased (p-value ≤ 0.001) in the 3rd month after completing CCRT.

Farhangfar et al in their study observed that food intake was normal in 56.5% and less than usual in 43.5% of head and neck cancer patients before radiotherapy and/or chemotherapy [18].

Eighty-nine per cent of head and neck cancer patients (89%) stopped food and water intake after 3 to 4 weeks of CCRT [19].

Sattianayagam et al observed that 55 % of patients had less than usual food intake, 45 % of patients had unchanged food intake and 4 % of patients had more than usual food intake over the preceding month [20].

1.3) Activities and function

Table-3 shows the activities and function of all 60 patients before CCRT, at the end of CCRT and at the 3rd month of follow up. Approximately 51% of patients had reported fairly normal activities before CCRT thereafter 30 % and 35% of patients had reported fairly normal activities at the end of CCRT and at 3rd month of follow up respectively, i.e. fairly normal activities of patients reduced due to CCRT then improve in follow up. At the end of CCRT, 36.67% of patients spend most of the day in bed/chair the percentage of these patients (31.67%) decreases at 3rd month of follow up. It was also observed that the percentage (13.33%) of bedridden patients increased after CCRT then the percentage (8.33%) of these patients decreased at 3rd month of follow up.

The number of patients with normal activities significantly (P-value ≤ 0.001) decreases at the end of CCRT and then increases significantly (P-value = 0.028) at 3rd month after the end of CCRT.

At the end of CCRT, the percentage of patients with fairly normal activities decrease significantly (P-value = 0.016) and those confined to bed/chair for more than 12 hours increase significantly (P-value ≤ 0.001).

Shivanna et al observed that 6.3% 38.29%,40.42% & 14.89% of patients had normal activities, fairly normal activities, less than half of day in bed/chair and most of the day in bed and chair respectively before treatment in head and neck cancer patients [21].

In head and neck cancer patients,15.7%,42.8%,14.2% & 17.1% of patients had normal activities, fairly normal activities, less than half of day in bed/chair and most of the day in bed and chair respectively before treatment [22].

1.75%,42.11%,36.84% & 17.54% of patients had normal activities, fairly normal activities, less than half of day in bed/chair and most of the day in bed and chair respectively in cancer patients during and after treatment [23].

Overall, 47% of patients rated their functional capacity as reduced before treatment in head and neck cancer patients [15].

1.4)Physical examination

Table -4 shows physical examinations of fat, muscle and fluid status of 60 patients before CCRT, at the end of CCRT and at the 3rd month of follow up.

Patients with normal physical examination were 30% before CCRT, 6.66% at the end of CCRT and 10% at the 3rd month of follow up. Mild deficit patients were 35%, 28.34% and 31.67% before CCRT, at the end of CCRT and at the 3rd month of follow up respectively. Percentages of moderate deficit patients were increased from 35%(before CCRT) to 56.66% (at end of CCRT). It is also observed that the percentage of patients with severe deficits increased after CCRT.

At the end of CCRT, there is a significant (P-value =0.017) increase of patients with the moderate deficit and there is also a significant (p-value =0.001) decrease of patients without deficit. 38.2%,19.30% and 36.84% of patients had no deficit, mild deficit and moderate deficit and severe deficit respectively in cancer patients before treatment [24].

19.30%%, 28.7%, 21.4% & 24.56% of patients had no deficit, mild deficit, moderate deficit and severe deficit respectively in cancer patients after treatment [25].

1.5) Weight change

Table -5 shows the weight change of 60 patients before CCRT, at the end of CCRT and at 3rd month of follow up. Weight loss of more than 5% was seen in 10% of patients before CCRT, 68.33% of patients at the end of CCRT and 16.66% of patients at the 3rd month of follow up.

There is a significant (p-value = 0.001) loss of $\geq$ 5% of body weight at the end of CCRT and then this $\geq$ 5% weight loss significantly decreases at the 3rd month following CCRT.

There is a significant (P-value =0.0004) gain in weight at the 3rd month of follow up after CCRT. Kubrak et al in their study observed that 15 % of head and neck cancer patients lose $\geq$ 5% weight before treatment [15]. Jager-Wittenaaret al reported that critical weight loss was present in 19% of the patients with head and neck cancer before treatment [26].

The prevalence of > 5% weight loss before treatment was 14% and, during and shortly after treatment was 57% in head and neck cancer patients [27]. The proportion of patients with >5% weight loss was 68 % during treatment [28]. Seventy-four percent of all patients lost more than 5 % of their body weight during radiation treatment [29].

CONCLUSION

The use of concomitant chemoradiation for locally advanced head and neck cancer has a noxious effect on the nutrition of patients. The early detection of poor diet in patients using PG-SGA score empowers the clinician to intervene early thereby reducing weight loss during the treatment.

REFERENCE

1. Soeters PB, Reijven PL, Van Bokhorst-de van der Schueren MA, et al. A rational approach to nutritional assessment. ClinNutr 2008;27:706–716.
2. Laviano A, Meguid MM, Rossi-Fanelli F (2003) Cancer anorexia: clinical implications, pathogenesis, and therapeutic strategies. Lancet Oncol 4(11):686–694. 2
3. Ramos EJ, Suzuki S, Marks D, Inui A, Asakawa A, Meguid MM (2004) Cancer anorexia–cachexia syndrome: cytokines and neuropeptides. CurrOpinClinNutrMetab Care 7(4):427–434
4. Vissink A, Jansma J, Spijkervet FK, Burlage FR, Coppes RP. Oral sequelae of head and neck radiotherapy. Crit Rev Oral Biol Med 2003;14:199–212.

5. Martin L, Senesse P, Gioulbasanis I, Antoun S, Bozzetti F, Deans C, et al. Diagnosticcriteriafortheclassificationof cancer-associated weight loss.JClinOncol 2015;33:90–9.

6. Pai PC, Chuang CC, Tseng CK, Tsang NM, Chang KP, Yen TC, et al. Impact of retreatment body mass index patients with head-and-neck cancer treated with radiation. Int J RadiatOncolBiolPhys 2012;83:e93–100

7. Tully CL, Snowdon DA. Weight change and physical function in older women: findings from the Nun Study. J Am GeriatrSoc 1995;43:1394–1397.

8. Barber MD, Fearon KC, Ross JA. Relationship of serum levels of interleukin-6, soluble interleukin-6 receptor and tumour necrosis factor receptors to the acute-phase protein response in advanced pancreatic cancer. ClinSci (Lond) 1999;96:83–87.

9. Boult C, Krinke UB, Urdangarin CF, Skarin V. The validity of nutritional status as a marker for future disability and depressive symptoms among high-risk older adults. J Am GeriatrSoc 1999;47:995–999

10. Brookes GB (1985) Nutritional status—a prognostic indicator in head and neck cancer. Otolaryngol Head Neck Surg 93:69–74

11. Guadagni M, Biolo G. Effects of inflammation and/or inactivity on the need for dietary protein. CurrOpinClinNutrMetab Care 2009;12:617–622.

12. Soeters PB, Grimble RF. Dangers, and benefits of the cytokine mediated response to injury and infection. ClinNutr 2009;28:583–596

13. Pichard C, Kyle UG, Morabia A, Perrier A, Vermeulen B, Unger P. Nutritional assessment: lean body mass depletion at hospital admission is associated with an increased length of stay. Am J ClinNutr 2004;79:613–618

14. Alshadwi A, Nadershah M, Carlson ER, Young LS, Burke PA, Daley BJ. Nutritionalconsiderations for head and neck cancer patients: a review of the literature. JOral Maxillofac Surg. 2013 Nov;71(11):1853-60.

15. Kubrak C, Olson K, Jha N, Jensen L, McCargar L, Seikaly H, Harris J, ScrimgerR, Parliament M, Baracos VE. Nutrition impact symptoms: key determinants ofreduced dietary intake, weight loss, and reduced functional capacity of patients with head and neck cancer before treatment. Head Neck. 2010 Mar;32(3):290-300.34.

16. Jager-Wittenaar H, Dijkstra PU, Vissink A, Langendijk JA, van der Laan BF, Pruim J, et al. Changes in nutritional status and dietary intake duringand after head and neck cancer treatment. Head Neck. 2011 ;33:863-70.

17. Jager-Wittenaar H, Dijkstra PU, Vissink A, van Oort RP, van der Laan BF, Roodenburg JL. Malnutrition in patients treated for oral or oropharyngeal cancer--prevalence and relationship with oral symptoms: an explorative study. Support Care Cancer. 2011;19(10):1675–1683. doi:10.1007/s00520-010-1001-z

18. Farhangfar A, Makarewicz M, Ghosh S, Jha N, Scrimger R, Gramlich L, BaracosV.Nutrition impact symptoms in a population cohort of head and neck cancerpatients: multivariate regression analysis of symptoms on oral intake, weightloss and survival. Oral Oncol. 2014 Sep;50(9):877-83.

19. Capuano G, Grosso A, Gentile PC, Battista M, Bianciardi F, Di Palma A, Pavese I, Satta F, Tosti M, Palladino A, Coiro G, Di Palma M. Influence of weight losson outcomes in patients with head and neck cancer undergoing concomitantchemoradiotherapy. Head Neck. 2008 Apr;30(4):503-8.

20. Sattianayagam PT, Lane T, Fox Z, Petrie A, Gibbs SD, Pinney JH, RisomSS,Rowczenio DM, Wechalekar AD, Lachmann HJ, Gilbertson JA, Hawkins PN, Gillmore JD.A prospective study of nutritional status in immunoglobulin light chainamyloidosis. Haematologica. 2013 Jan;98(1):136-40

21. Shivanna LM, Kotebagilu NP, Urooj A. Validation of assessment categories of the patient-generated subjective global assessment tool in classifying the nutritional status of cancer patients. Int J NutrPharmacolNeurol Dis 2018;8:79-85.

22. Parasa, Kavya&Avvaru, Dr.Krishnaveni. (2016). Assessment of Nutritional Status of Cancer Patients Using Scored PG-SGA Tool. IOSR Journal of Dental and Medical Sciences. 15. 37-40.

23. Sharma D, Kannan R, Tapkire R, Nath S. Evaluation of Nutritional Status of Cancer Patients during Treatment by Patient-Generated Subjective Global Assessment: a Hospital-Based Study. Asian Pac J Cancer Prev. 2015;16(18):8173-6.
24. Ge T, Lin T, Yang J, Wang M. Nutritional status and related factors ofpatients with advanced lung cancer in northern China: a retrospective study.Cancer Manag Res. 2019 Mar 19;11:2225-2231.
25. Sharma D, Kannan R, Tapkire R, Nath S. Evaluation of Nutritional Status of Cancer Patients during Treatment by Patient-Generated Subjective Global Assessment: a Hospital-Based Study. Asian Pac J Cancer Prev. 2015;16(18):8173-6.
26. Jager-Wittenaar H, Dijkstra PU, Vissink A, van der Laan BF, van Oort RP,RoodenburgJL.Critical weight loss in head and neck cancer--prevalence and risk
27. factors at diagnosis: an explorative study. Support Care Cancer.2007;15(9):1045-50.
28. Langius JA, Bakker S, Rietveld DH, et al. Critical weight loss is a major prognostic indicator for disease-specific survival in patients with head and neck cancer receiving radiotherapy. Br J Cancer. 2013;109(5):1093–1099.
29. Ghadjar P, Hayoz S, Zimmermann F, Bodis S, Kaul D, Badakhshi H, Bernier J,Studer G, Plasswilm L, Budach V, Aebersold DM; Swiss Group for Clinical CancerResearch (SAKK). Impact of weight loss on survival after chemoradiation forlocally advanced head and neck cancer: secondary results of a randomized phaseIII trial (SAKK 10/94). RadiatOncol. 2015 Jan 17;10:21.
30. Lønbro S, Petersen GB, Andersen JR, Johansen J. Prediction of critical weight loss during radiation treatment in head and neck cancer patients is dependent on BMI. Support Care Cancer. 2016 May;24(5):2101-2109.