The Impact of Active Nutritional Support for Head and Neck Cancer Patients Receiving Concurrent Chemoradiotherapy

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ABSTRACT

Objective: Malnutrition is the most common problem in head and neck cancer (HNC) patients receiving concurrent chemoradiotherapy. The radiation toxicities cause decreased food intake, with resultant severe weight loss and malnutrition. This study sought to determine whether an active nutrition improvement counseling program before and during concurrent chemoradiotherapy for HNC patients could increase the treatment completion rate without the interruptions caused by the side effects of chemoradiotherapy.

Methods: The findings of a prospective study of the effects of an active nutrition improvement program before and during concurrent chemoradiotherapy (study, n = 32) was compared with those of a retrospective chart review of HNC patients who had received definite or postoperative concurrent chemoradiotherapy (control, n = 80). The correlations between nutritional status and the number of treatment completions, number of tube feeding insertions during treatment, RTOG toxicity, nutritional status, and quality of life were obtained.

Results: There was no statistically significant difference between the concurrent chemoradiotherapy completion rates of both groups (p = 0.121; 95% CI, 0.226-1.188). The major cause of delayed or discontinued chemotherapy was oral mucositis. No significant differences were found in the tube feeding insertion rates and RTOG toxicities of both groups. However, the data showed a clinically significant difference in the concurrent chemoradiotherapy completion rate for the study group (56%), more than 15 percentage points higher than the control group's rate (40%).

Conclusion: An active nutrition improvement program before and during concurrent chemoradiotherapy is clinically beneficial for HNC patients, providing a higher treatment completion rate than otherwise.

Keywords: Head and neck cancer; radiotherapy; chemotherapy; chemoradiotherapy; nutrition. (Siriraj Med J 2020; 72: 47-58)

INTRODUCTION

Head and neck cancer (HNC) is one of the most common malignancies in the world, with high mortality rates in developing countries.[1] In 2016, Siriraj Cancer Registry reported that HNC accounted for 6.9% of newly diagnosed cancers.[2] Malnutrition as a comorbidity of cancer has been recognized. A study by Unsai et al. that evaluated the nutritional status of HNC patients receiving radiotherapy found that a quarter of the patients had malnutrition at presentation. Although the number with

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malnutrition had increased by more than three quarters by the end of the treatment, the patients subsequently demonstrated nutritional improvement by their 3- to 6-month follow-ups.[3]

Nutritional status is a modifiable factor that impacts on disease prognosis and treatment compliance. In the case of HNC, Langius et al. found that weight loss both before and during radiotherapy was an important prognostic indicator for 5-year disease-specific survival.[4] Another study found that less weight loss was experienced by radiotherapy-receiving patients with HNC or gastrointestinal cancer who had attended intensive nutrition counseling sessions than those just given standard care[5]

The aim of this study was to establish the impact of the nutritional status of HNC patients on treatment compliance, radiation toxicities, rate of any tube feeding, and quality of life.

MATERIALS AND METHODS

This study was performed at the Division of Radiation Oncology, Department of Radiology, Faculty of Medicine Siriraj Hospital, Mahidol University, during 2016-2017. A quasi-experimental study design was used to compare patients receiving routine pretreatment counseling with those participating in an active nutrition improvement program conducted by a physician. The study was approved by the Ethics Committee of the Siriraj Institutional Review Board (Si 797/2016).

The candidates in this study were newly diagnosed HNC patients (nasopharyngeal, oral cavity, oropharyngeal, laryngeal, and hypopharyngeal cancers) aged 18-80 years with an Eastern Cooperative Oncology Group (ECOG) performance status of 0-2. Those patients treated with a curative aim received either prescribed concurrent chemoradiotherapy or postoperative concurrent chemoradiotherapy. We excluded patients who had early stage (T1N0M0) or distant metastatic (M1) diseases. Candidates were also excluded if they had other malignancies; had received neoadjuvant chemotherapy or previous radiotherapy; or had medical illnesses that would compromise their ability to complete the study, such as a systemic infection. Data were collected during the chemoradiotherapy treatment and through to the 3-month follow-up.

Study population

Control group (retrospective study)

A retrospective chart review was conducted of newly diagnosed HNC patients who had received definite concurrent chemoradiotherapy or postoperative concurrent chemoradiotherapy for curative intent January-December 2016. The information was collected from the records relating to the patients' first visits to the Division of Radiation Oncology, their entire treatment schedule, and the follow-up conducted 3 months after treatment completion. Those patients were all scheduled for routine, pretreatment counseling.

Study group (prospective study)

A prospective intervention was undertaken of newly diagnosed HNC patients with a curative aim who had been scheduled for definite concurrent chemoradiotherapy or postoperative concurrent chemoradiotherapy January-December 2017. At least one month before starting the radiotherapy, the patients began to participate in an active nutrition improvement program conducted by their physician. The program sessions were held at the date of enrollment, every 2 weeks before radiotherapy started, and every week during their treatment. All patients gave written, informed consent before commencing the program.

Definitions and terms

- Head and neck cancer (HNC) was one whose primary site was the nasopharynx, oral cavity, oropharynx, hypopharynx, or larynx. The tumor staging was determined in accordance with the American Joint Committee on Cancer (AJCC) Cancer Staging Manual, Seventh Edition (2010).
- The active nutrition improvement program for the study group was the nutrition counseling provided by the physician, comprising nutrition recommendations, guidance on the calculation of a proper calorie-intake (30-35 kcal/kg), and a notebook for the patients' daily dietary records. A serial assessment was performed at the first visit; the first, fourth, and last weeks of the radiation treatment; and then at the first, second, and third months after treatment completion. Two tools were used for this purpose: the Patient-Generated Subjective Global Assessment (PG-SGA), and the Functional Assessment of Cancer Therapy–Head and Neck (FACT–H&N, version 4).
- The radiotherapy techniques in this study were either the three-dimensional conformal radiation therapy or volumetric modulated arc therapy.
- The concurrent chemotherapy regimen (Cisplatin or Carboplatin) selected for each patient was based on medical oncologists' judgments.
- Treatment completion was deemed to have occurred if an HNC patient attended and finished the definite concurrent chemoradiotherapy or

postoperative concurrent chemoradiotherapy treatment sessions as scheduled, without any interruptions or postponements.

The study hypothesis and objectives

It was hypothesized that the active nutrition improvement program would lessen the incidences of treatment interruption or postponement.

The primary objective was to study the impact of nutritional status before and during the radiotherapy and chemotherapy treatment on patients' rates of treatment completion, without any interruptions or postponements resulting from treatment-related side effects.

The secondary objectives were to review the relationships between the patients' nutritional statuses before and during treatment and the feeding tube insertion rate, Radiation Therapy Oncology Group (RTOG) radiation toxicity grading, nutritional statuses (PG-SGA), and quality of life (FACT–H&N, version 4).

Statistical analysis

From the Siriraj Hospital medical record reviewed of the 45 patients with head and neck cancer, 17 (37%) of the patients experienced an interruption in concurrent chemoradiotherapy. We considered a 15% reduction in treatment interruption, so, the sample size should be 62 evaluable patients per treatment group, the study had an 80% power to detect an absolute difference of 15% in the treatment interruption rate, assuming a two-sided test and an overall significance level of 0.05.

For comparisons between the two groups, continuous variables were analyzed using Mann-Whitney U tests, whereas chi-squared or Fisher's exact tests and univariate analysis by logistic regression were used for categorical variables. A p-value of < 0.05 was considered statistically significant. The statistical analyses were conducted using IBM SPSS Statistics for Windows, version 21 (IBM Corp., Armonk, NY, USA).

RESULTS

A total of 112 HNC patients were included in the study. Of those, 80 were in the control group (the retrospective chart review of patients receiving treatment January-December 2016), but only 32 were in the study group (the prospective study of patients undergoing treatment January-December 2017). The patients in the study group were not reach the target but we had desired to stop enrolled the patients because it was at the end of the year 2017. The patients received definite concurrent chemoradiotherapy or postoperative concurrent chemoradiotherapy. Seventy-three patients in the control group and 27 in the study group remained throughout the study. In control group, 1 patient had refused the radiotherapy during the treatment period and after complete treatment, 4 patients had disease progression, 2 patients had lost to follow-up. In study group, 1 patient had refused the radiotherapy during the treatment period and 1 patient had died from hemorrhagic stroke, 2 patients had disease progression and 1 patient had lost to follow-up.

For both groups, the demographic data and patient characteristics were similar. The majority of patients were male (77.7%), and the mean age was 56.11 ± 9.94 years. Almost half of the patients were diagnosed with nasopharyngeal cancer (45.5%). Most of the patients had lymph node involvement (84.9%), and half had stage IV disease (55.4%). These patients received radiotherapy via the volumetric modulated arc therapy technique (83%), concurrent with Cisplatin (88.4%). About 18% of the patients had tube feeding before enrollment, and this was the same proportion as those who experienced significant weight loss following their diagnosis with cancer. In the case of the study group, none of the patients who enrolled in the active nutrition improvement program had severe malnutrition at the time of diagnosis (Tables 1 and 2).

A comparison of the two groups did not reveal any statistically significant difference in their treatment completion rates ($p = 0.121$; 95% CI, 0.226-1.188). Nevertheless, the completion rate for concurrent chemoradiotherapy was clinically significant for the study group (56%), being 16 percentage points better than that of the control group (40%). Similarly, the chemotherapy compliance of the study group (56.3%) was 15 percentage points better than that of the control group (41.3%). Most patients in both groups were able to attend their radiotherapy sessions without interruption, with 81.3% and 77.5% attendance rates for the patients in the study and control groups, respectively (Table 3).

Even in the multivariate analysis, adjusted by defining the prognostic factors for age ≤ 60 years versus > 60 years, nasopharyngeal cancer versus non-nasopharyngeal cancer, and stages I–III disease versus stage IV disease, the differences showed no statistical significance for both groups ($p = 0.118$; 95% CI, 0.288-1.183; Table 4).

As to patients who had their treatment delayed, 25% of the control group patients experienced oral mucositis, with half of those (55.3%) being prescribed narcotic drugs. However, just 3.1% of the patients in the study group experienced the same treatment side effect, with only 22.2% of the ones affected being given narcotic drugs (Table 5).

TABLE 1. Baseline patient characteristics: demographics.

Characteristics	Control (n = 80)	Study (n = 32)	Total (n = 112)	*P*-value
Sex				
Male	59 (73.8%)	28 (87.5%)	87 (77.7%)	
Female	21 (26.3%)	4 (12.5%)	25 (22.3%)	0.137
Age (mean ± SD)	56.11 (± 9.94)	55.88 (± 12.52)	56.04 (± 10.69)	0.916
Site				
Nasopharynx	36 (45%)	15 (46.9%)	51 (45.5%)	
Oropharynx	18 (22.5%)	4 (12.5%)	22 (19.6%)	
Oral cavity	14 (17.5%)	3 (9.4%)	17 (15.2%)	
Larynx	7 (8.8%)	5 (15.6%)	12 (10.7%)	
Hypopharynx	5 (6.3%)	5 (15.6%)	10 (8.9%)	0.267
T stage				
1	18 (22.5%)	4 (12.5%)	22 (19.6%)	
2	23 (28.8%)	5 (15.6%)	28 (25%)	
3	16 (20%)	11 (34.4%)	27 (24.1%)	
4	23 (28.8%)	12 (37.5%)	35 (31.3%)	0.160
N stage				
0	14 (17.5%)	3 (9.4%)	17 (15.2%)	
1	14 (17.5%)	6 (18.8%)	20 (17.9%)	
2	44 (55%)	19 (59.4%)	63 (56.3%)	
3	8 (10%)	4 (12.5%)	12 (10.7%)	0.768
Stage				
I	2 (2.5%)	0 (0%)	2 (1.8%)	
II	7 (8.8%)	3 (9.4%)	10 (8.9%)	
III	27 (33.8%)	11 (34.4%)	38 (43.8%)	
IVA	35 (43.8%)	14 (43.8%)	49 (43.8%)	
IVB	9 (11.3%)	4 (12.5%)	13 (11.6%)	1.000

During the treatment, about 30% of the patients in both groups required enteral tube feeding. As shown in Table 6, most of them preferred nasogastric (NG) feeding (94.1%), but 5.9% elected to be fed via percutaneous endoscopic gastrostomy (PEG).

Serial assessments of the patients' nutritional statuses were performed during the treatment and throughout the study. Looking at the body-weight changes between before-receiving the treatment and at the end of treatment, patients suffering more than 10% weight loss represented 34.2% and 16.1% of those in the control and study groups, respectively. During the first month following treatment, weight was regained, but the gain was better in the study group than in the control group. However, by 3 months, weight gain had improved equally in both groups (Table 7).

The percentage of body-weight change was calculated at each patient assessment to monitor the progression of weight loss. We used the median percentage of the body-weight change of each group as a comparable value measurement, and the dynamic weight changes were plotted on a line graph (Fig 1). Once the concurrent chemoradiotherapy started, patients experienced gradual weight losses throughout the study. There was a statistically significant difference 1 month after treatment completion: at that time, the study group patients were likely to have less weight loss than those in the control group. However, at the end of the study, there was no statistical difference in the weight changes of the two groups.

TABLE 2. Baseline patient characteristics: treatment and nutritional status.

Characteristics	Control (n = 80)	Study (n = 32)	Total (n = 112)	*P*-value
Radiation technique				
3D[1]	15 (18.8%)	4 (12.5%)	19 (17%)	
VMAT[2]	65 (81.3%)	28 (87.5%)	93 (83%)	0.580
Type of treatment				
CCRT	62 (77.5%)	26 (81.3%)	88 (78.6%)	
Postop CCRT	18 (22.5%)	6 (18.8%)	24 (21.4%)	0.801
Chemotherapy regimen				
Cisplatin	71 (88.8%)	28 (87.5%)	99 (88.4%)	
Carboplatin	9 (11.3%)	4 (12.5%)	13 (11.6%)	1.000
Tube feeding (before treatment)				
No	65 (81.3%)	26 (81.3%)	91 (81.3%)	
Yes	15 (18.8%)	6 (18.8%)	21 (18.8%)	1.000
NG[4] (n = 21)	–	1 (14.3%)	1 (4.5%)	
PEG[5] (n = 21)	15 (100%)	5 (83.3%)	20 (95.2%)	0.286
% Baseline body-weight loss				
Nil	46 (57.5%)	17 (53.1%)	63 (56.3%)	
< 5%	23 (28.8%)	9 (28.1%)	32 (28.6%)	
5%-10%	9 (11.3%)	5 (15.6%)	14 (12.5%)	
> 10%	2 (2.5%)	1 (3.1%)	3 (2.7%)	0.889
Nutritional status (PG-SGA[6])				
A	–	19 (59.4%)	19 (59.4%)	
B	–	13 (40.6%)	13 (40.6%)	
C	–	–	–	
QOL mean score (± SD)	–	71.97 (± 9.74)	–	

Abbreviations: 3D = Three-dimensional conformal radiotherapy; VMAT = Volumetric modulated arc therapy; CCRT = Concurrent chemoradiotherapy; NG = Nasogastric tube; PEG = Percutaneous endoscopic gastrostomy; PG-SGA = Patient-Generated Subjective Global Assessment

Radiation oral mucositis and radiation dermatitis were the common acute complications of the radiotherapy. The descriptive data showed that in the control group, those complications developed at the third week of treatment, which was 1 week earlier than for the study group (Figs 2 and 3).

With patients who had participated in the active nutrition improvement program (the study group), serial assessments using their nutritional status classified by PG-SGA were performed at the first visit; the first, fourth, and last week of treatment; and the first, second, and third month after finishing the treatment. The patients' nutritional statuses were divided into 3 classes: Class A, well-nourished (scores 1-8); Class B, moderately malnourished (scores 9-18); and Class C, severely malnourished (scores > 18). At the first visit, most of the patients had good nutritional status, and none had severe malnutrition. However, during the treatment, almost all of the patients became malnourished. Fortunately, their nutritional statuses improved during the three months after the completion of the treatment (Fig 4). In addition, the quality of life by functional assessment of cancer therapy (FACT-H&N, version 4) was performed. Although the mean of the quality of life score reduced gradually, the mean score fell by less than 10 points (Fig 5).

TABLE 3. Results of treatment.

Treatment	Control	Study	Total	*P*-value	Odds Ratio*	95% CI
Concurrent Chemoradiotherapy						
Complete	32 (40%)	18 (56.3%)	50 (44.6%)			
Incomplete	48 (60%)	14 (43.8%)	62 (55.4%)	0.121	0.519	0.226–1.188
Radiotherapy						
Complete	76 (95%)	31 (96.9%)	107 (95.5%)			
Incomplete	4 (5%)	1 (3.1%)	5 (4.5%)	0.515	0.484	0.54–4.312
Radiotherapy: interruption						
No	62 (77.5%)	26 (81.3%)	91 (79.1%)			
Yes	18 (22.5%)	6 (18.8%)	24 (21.4%)	0.663	0.795	0.283–2.229
≤ 7 days	8 (10%)	3 (9.4%)	11 (9.8%)	0.632	0.715	0.182–2.813
> 7 days	10 (12.5%)	3 (9.4%)	13 (11.6%)	0.813	0.8	0.126–5.092
No	63 (78.8%)	25 (78.1%)	88 (78.6%)			
Yes	17 (21.3%)	7 (21.9%)	24 (21.4%)	0.942	1.038	0.384–2.806
Chemotherapy						
Complete	33 (41.3%)	18 (56.3%)	51 (45.5%)			
Incomplete	47 (58.8%)	14 (43.8%)	61 (54.5%)	0.152	0.546	0.239–1.250
Chemotherapy compliance						
60%–100%**	73 (91.3%)	30 (93.8%)	103 (92%)			
< 60%	7 (8.8%)	2 (6.3%)	9 (8%)	0.662	0.695	0.136–3.541
Compliance of Cisplatin						
100%	27 (37.5%)	16 (57.1%)	43 (43%)	0.26	0.281	0.031–2.552
66%	39 (54.2%)	11 (39.9%)	50 (50%)	0.642	0.591	0.064–5.442
33%	6 (8.3%)	1 (3.6%)	7 (7%)			
Compliance of Carboplatin						
100%	6 (75%)	2 (50%)	8 (66.7%)	0.501	3	0.122–73.64
66%–83%	1 (12.5%)	1 (25%)	2 (16.7%)	1	1	0.020–50.39
< 50%	1 (12.5%)	1 (25%)	2 (16.7%)			

*The reference group was the control group; **Cisplatin 2/3 cycles or Carboplatin > 4/6 cycles

TABLE 4. Results of treatment: multivariate analysis by logistic regression.

Treatment	Control	Study	Total	*P*-value	Odds Ratio*	95% CI
Concurrent Chemoradiotherapy						
Complete	32 (40%)	18 (56.3%)	50 (44.6%)			
Incomplete	48 (60%)	14 (43.8%)	62 (55.4%)	0.118	0.514	0.224–1.183

*The reference group was the control group; adjusted by age ≤ 60 versus > 60 years, nasopharyngeal versus non-nasopharyngeal, and stages I, II, III versus stage IV

TABLE 5. Cause of treatment delays, and the treatments for oral mucositis.

Treatment	Control	Study	Total	*P*-value	Odds Ratio*	95% CI
No treatment delay	33 (41.3%)	18 (56.3%)	51 (45.5%)			
Cause of the treatment delay						
Oral mucositis	20 (25%)	1 (3.1%)	21 (18.8%)			
Dermatitis	1 (1.3%)	1 (3.1%)	2 (1.8%)			
Hematologic toxicity	2 (2.5%)	2 (6.3%)	4 (3.6%)			
Renal toxicity	7 (8.8%)	1 (3.1%)	8 (7.1%)			
Infection	4 (5%)	–	4 (3.6%)			
Body-weight loss	1 (1.3%)	1 (3.1%)	2 (1.8%)			
N/A	12 (15%)	8 (25%)	20 (17.9%)	0.071		
Oral mucositis treatment						
Non-narcotic drug	17 (44.7%)	7 (77.8%)	24 (51.1%)			
Narcotic drug	21 (55.3%)	2 (22.2%)	38 (48.9%)	0.091	0.231	0.042–1.262

*The reference group was the control group

TABLE 6. Tube feeding during treatment.

Results	Control	Study	Total	*P*-value	Odds Ratio*	95% CI
Tube feeding	25 (31.3%)	9 (28.1%)	34 (30.4%)	0.745	0.861	0.349–2.126
NG[1]	23 (92%)	9 (100%)	32 (94.1%)			
PEG[2]	2 (8%)	–	2 (5.9%)	1.000		

*The reference group was the control group

Abbreviations: NG = Nasogastric tube; PEG = Percutaneous endoscopic gastrostomy

TABLE 7. Percentage of body-weight loss: during treatment and follow-up

Body-weight loss	Control	Study	Total	*P*-value
Week 1				
N	80	32	112	
Nil	41 (51.3%)	22 (66.8%)	63 (56.3%)	
< 5%	25 (31.3%)	7 (21.9%)	32 (28.6%)	
5%–10%	11 (13.8%)	2 (6.3%)	13 (11.6%)	
> 10%	3 (3.8%)	1 (3.1%)	4 (3.6%)	0.42
Week 2				
N	80	31	111	
Nil	22 (27.5%)	9 (29%)	31 (27.9%)	
< 5%	44 (55%)	20 (64.5%)	64 (57.7%)	
5%–10%	13 (16.3%)	2 (6.5%)	15 (13.5%)	
> 10%	1 (1.3%)	–	1 (0.9%)	0.634
Week 3				
N	79	31	110	
Nil	8 (10.1%)	6 (19.4%)	14 (12.7%)	
< 5%	46 (58.2%)	15 (48.4%)	61 (55.5%)	
5%–10%	25 (31.6%)	9 (29%)	34 (30.9%)	
> 10%	–	1 (3.2%)	1 (0.9%)	0.143
Week 4				
N	79	31	110	
Nil	10 (12.7%)	5 (16.1%)	15 (13.6%)	
< 5%	29 (36.7%)	13 (41.9%)	42 (38.2%)	
5%–10%	36 (45.6%)	12 (38.7%)	48 (43.6%)	
> 10%	4 (5.1%)	1 (3.2%)	5 (4.5%)	0.866
Week 5				
N	77	31	108	
Nil	5 (6.5%)	4 (12.9%)	9 (8.3%)	
< 5%	27 (35.1%)	12 (38.7%)	39 (36.1%)	
5%–10%	31 (40.3%)	13 (41.9%)	44 (40.7%)	
> 10%	14 (18.2%)	2 (6.5%)	16 (14.8%)	0.330
End of treatment				
N	79	31	110	
Nil	7 (8.9%)	5 (16.1%)	12 (10.9%)	
< 5%	16 (20.3%)	6 (19.4%)	22 (20%)	
5%–10%	29 (36.7%)	15 (48.4%)	44 (40%)	
> 10%	27 (34.2%)	5 (16.1%)	32 (29.1%)	0.170
1st FU (1 month after RT)				
N	79	31	110	
Nil	4 (5.1%)	6 (19.4%)	10 (9.2%)	
< 5%	11 (14.1%)	10 (32.3%)	21 (19.3%)	
5%–10%	30 (38.5%)	5 (16.1%)	35 (32.1%)	
> 10%	33 (42.3%)	10 (32.3%)	43 (39.4%)	0.005
2nd FU (2 months after RT)				
N	76	28	104	
Nil	9 (11.8%)	6 (21.4%)	15 (14.4%)	
< 5%	14 (18.4%)	7 (25%)	21 (20.2%)	
5%–10%	16 (21.1%)	7 (25%)	23 (22.1%)	
> 10%	37 (48.7%)	8 (28.6%)	45 (43.3%)	0.284
3th FU (3 months after RT)				
N	73	27	100	
Nil	11 (15.1%)	5 (18.5%)	16 (16%)	
< 5%	12 (16.4%)	9 (33.3%)	21 (21%)	
5%–10%	11 (15.1%)	2 (7.4%)	13 (13%)	
> 10%	39 (53.4%)	11 (40.7%)	50 (50%)	0.226

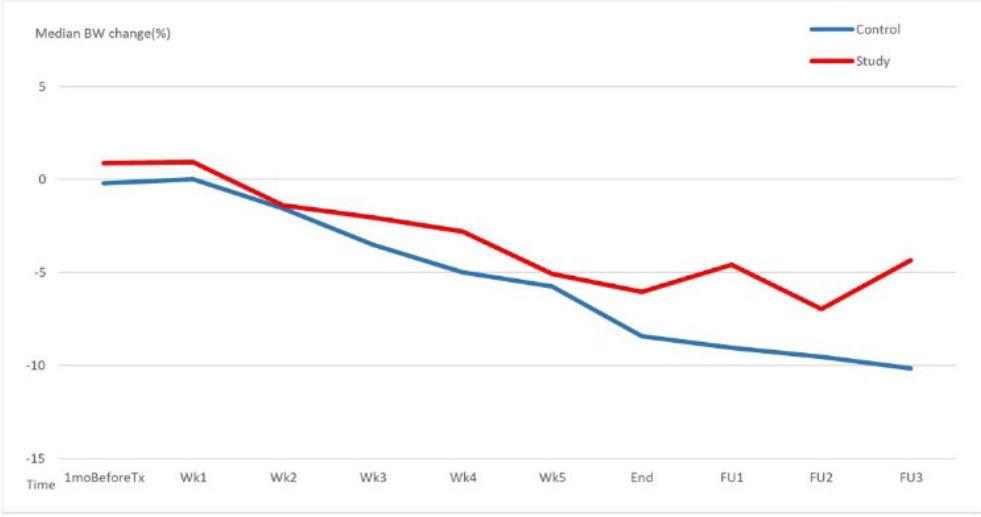

Fig 1. Median percentages of the body-weight changes.
P-value from Mann-Whitney U test

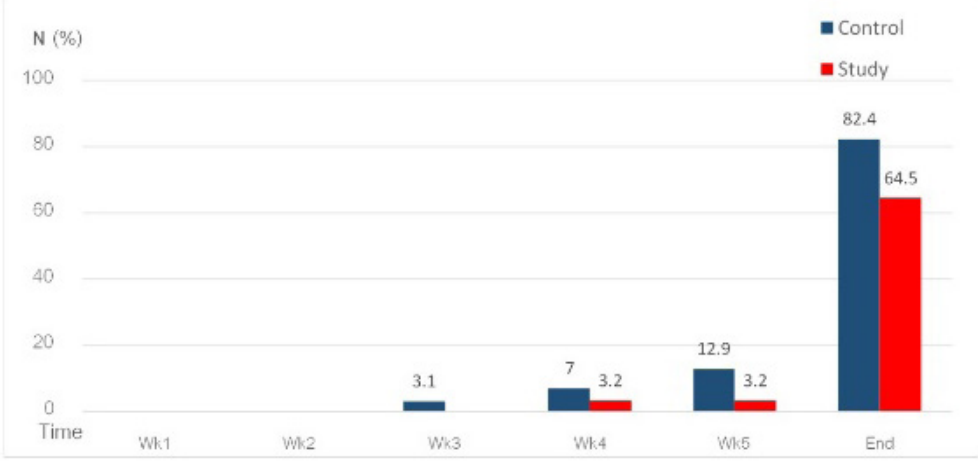

Fig 2. Acute complications: grand 2 or grade 3 radiation oral mucositis.

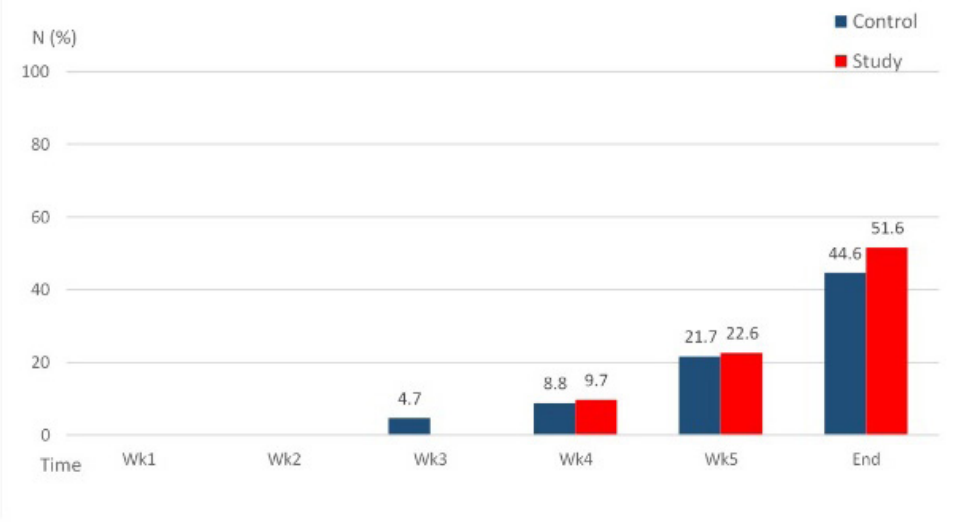

Fig 3. Acute complications: grand 2 or grade 3 radiation dermatitis.

Fig 4. Nutritional status by PG-SGA.

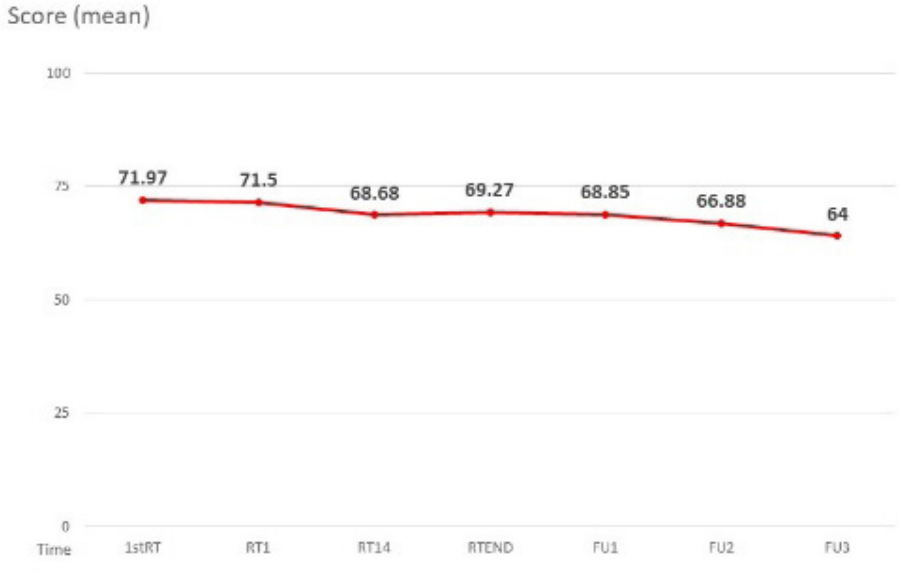

Fig 5. Mean score of quality of lfe by functional assessment of cancer therapy: mean score by FACT-H&N version 4.

DISCUSSION

Patients who have been diagnosed with cancer usually experience weight loss and/or malnutrition, especially in the case of those with HNC. White et al. identified that malnutrition could affect cancer patients' functional and quality of life outcomes.[6] They also established easy criteria to identify severe malnutrition by using the percentage of weight loss from baseline: > 5% within 1 month, > 7.5% within 3 months, > 10% within 6 months, and > 20% within 1 year. In another study, O'Neill and Shaha assessed malnutrition by using either the percentage of weight loss during the preceding 6 months (the difference between the usual weight and the actual, current weight) or the gold standard method, PG-SGA, to monitor the nutritional status of patients.[7] They recommended that malnutrition be corrected in order to reduce the morbidity and mortality rates resulting from treatment effects. Several other studies have found that HNC patients experience a reduced calorie intake and a consequential weight loss before and during treatment. The studies suggested that

early intervention (active dietary counseling, the addition of nutrition supplements, or the use of a prophylactic feeding tube) may improve patients' nutritional statuses.[8-11]

There are a number of ways to manage the nutrition of HNC patients. Many studies have explored effective ways to improve nutrition before, during, and after cancer treatment, especially concurrent chemoradiotherapy. Prophylactic enteral feeding using a PEG or NG tube, and which was done with and without a nutrition supplement before cancer treatment, demonstrated no effects on weight loss, quality of life, or nutritional improvement.[12–13] However, the prophylactic enteral feeding revealed the benefit of overall clinical outcome improvements and a decline in the incidences of serious treatment side effects. Prophylactic enteral tube feeding was indicated in those patients who were predicted to have severe malnutrition, were curative aim patients with old age and locally advanced disease (T3/T4 and/or lymph node involvement), and were undergoing post-radical surgery with a reconstruction procedure and concurrent chemoradiotherapy.[14-16]

Pretreatment weight loss is an important prognostic indicator for the overall survival of HNC patients. The benefit of individual dietary counseling is that it helps maintain good nutrition in HNC patients. Isenring et al. demonstrated that early and intense nutrition intervention in the form of individual nutrition counseling and oral supplements not only minimized weight loss and the ensuing deterioration in nutritional status, quality of life and physical function, but it also reduced the risks of infection and treatment toxicities.[5]

In this study, the primary outcome was to explore the correlation between nutritional improvement and the rate of treatment completion. There were no significant differences in the patient characteristics of the study and control groups. Most of the patients were middle-aged men who had been diagnosed with locally advanced HNC and had received volumetric modulated arc therapy concurrent with a cisplatin regimen. The active nutrition improvement program with serial nutritional assessments was introduced to the study group. There was clinical significance in the higher rate of treatments that were completed as scheduled by these study group patients. The active nutritional counseling also provided a clinical benefit by way of improved compliance with chemotherapy. The number of chemotherapy completions by the study group, 56%, was 15 percentage points higher than the corresponding figure for patients in the control group (40%), who had only been given routine counseling. We also examined whether there was a correlation between the nutrition improvement program and serial assessments and chemotherapy tolerance. To this end, the causes of treatment interruptions and postponements were studied. We found that common problems after receiving concurrent chemoradiotherapy were oral mucositis and dermatitis, mainly occurring 3 to 4 weeks after starting the radiation treatment. In the control group, the mucositis developed sooner and with more severe pain, indicated by the greater number of patients using a narcotic drug in that group than in the study group.

As to the secondary outcomes, only one-third of the patients in each group required enteral feeding. NG-tube feeding was mostly selected because it is less invasive than PEG. Approximately the same proportion of patients in each group had experienced a significant weight loss by the third week of treatment. This correlated with the onset of mucositis and dermatitis, which were the common acute complications. Unfortunately, nutritional assessments using the PG-SGA classification were only conducted for the patients in the study group. The descriptive data showed that most of the patients were well-nourished at their initial diagnosis. However, during their treatment, they became moderately to severely malnourished. We assume that was because of the natural course of the disease and/or the acute complications of the treatment, such as mucositis, which might have interfered with the patients' oral food intake. However, most of the patients recovered to a normal, or mildly malnourished, status within 3 months of treatment cessation.

CONCLUSION

The active nutrition improvement program, a noninvasive procedure conducted by a physician, was clinically beneficial. Compared to the patients receiving only routine dietary counseling, the nutrition improvement program produced a higher scheduled treatment completion rate (i.e., without interruption or postponement), improved chemotherapy tolerance, and a lower and delayed incidence of mucositis. Given that the active counseling program is not too complicated and could be easily conducted by any paramedic, we recommend that it be provided as part of treatment protocols.

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