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Research

*Corresponding author
Koji Amano, MD
Department of Palliative Medicine
Osaka City General Hospital
2-13-22 Miyakojima-Hondori
Miyakojima-ku, Osaka City
Osaka 534-0021, Japan
Tel. +81-6-6929-1221
Fax: +81-6-6929-1091
E-mail: kojiamano4813@gmail.com

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A Feasibility Study to Investigate the Effect of Nutritional Support for Advanced Cancer Patients in an Inpatient Hospice in Japan

Koji Amano, MD[1*]; Isseki Maeda, MD, PhD[2]; Hiroto Ishiki, MD[3]; Tatsuya Morita, MD[4]; Teruaki Uno, MD[1]; Hirofumi Katayama, MD[1]; Ryohei Tatara, MD[1]

[1]Department of Palliative Medicine, Osaka City General Hospital, 2-13-22 Miyakojima-hondori, Miyakojima-ku, Osaka City, Osaka 534-0021, Japan
[2]Gratia Hospital Hospice, 6-14-1 Aomadaninishi, Mino City, Osaka 562-8567, Japan
[3]Department of Palliative Medicine, The Institute of Medical Science, The University of Tokyo, 4-6-1 Shirokanedai, Minato-ku, Tokyo, Japan
[4]Palliative and Supportive Care Division, Seirei Mikatahara General Hospital, 3453 Mikatahara-cho, Kita-ku, Hamamatsu City, Shizuoka 433-8558, Japan

ABSTRACT

Backgrounds: There has been no prospective study to investigate the effect of nutritional support for advanced cancer patients in inpatient hospices. Therefore, we conducted a prospective observational study to explore the feasibility of investigating the effect of nutritional support for advanced cancer patients in an inpatient hospice.
Methods: We prospectively collected the following data: performance status, results of blood tests, calorie and protein intake, body weight, skeletal muscle mass, and Functional Assessment of Anorexia/Cachexia Therapy (FAACT) on the 1st day of admission and every 2 weeks. All patients were followed-up to their discharge or 4 weeks. Primary endpoint was percentage of patients who completed the intervention. Secondary endpoints were overall survival and improvement of Karnofsky Performance Status (KPS) in the 2nd week. Subgroup analysis was performed by dividing patients into 3 groups with change of KPS in the second week (improving, maintaining, and deteriorating KPS groups).
Results: A total of 43 patients met the inclusion criteria, and among them, 14 refused to participate. Thus, 29 were analyzed in the present study**.** The percentage of patients who completed the intervention in the 2nd week was 93.1% and in the 4th week 44.8%. Sixteen patients, 55.2%, were alive 4 weeks. The KPS improvement rate was 41.4%. The 29 patients were divided into improving KPS (n=12), maintaining KPS (n=9), and deteriorating KPS (n=8). All patients in improving KPS and 4 patients in maintaining KPS were alive 4 weeks. Survival decreased with deterioration of KPS (p<0.001). Calorie/protein sufficiency rate and FAACT score of patients in improving KPS group temporarily improved in the 2nd week.
Conclusions: This study indicated the feasibility of conducting trials to investigate the effect of nutritional support for advanced cancer patients in an inpatient hospice.

KEYWORDS: Advanced cancer patient; Inpatient hospice; Nutritional support; Feasibility; Cancer cachexia.

ABBREVIATIONS: FAACT: Functional Assessment of Anorexia/Cachexia Therapy; KPS: Karnofsky Performance Status; PPI: Palliative Prognostic Index; IRB: Institutional Review Board; MHLW: Ministry of Health, Labor and Welfare; BEE: Basal Energy Expenditure; BIA: Bioelectrical Impedance Analysis; BMI: Body Mass Index.

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INTRODUCTION

A great number of advanced cancer patients are suffering from physical and psychosocial burdens due to cancer cachexia.[1-3] Involuntary weight loss, a main symptom of cancer cachexia, often follows anorexia and declining food intake, and thus these are causes of distress for patients.[1-3] Involuntary weight loss links to the deterioration of performance status, quality of life (QoL), nutritional status, treatment outcomes, and survival in advanced cancer patients.[4-9] However, there is limited data from randomized controlled trials (RCT) about the treatment of cachexia in advanced cancer patients,[4-9] while several studies have revealed the potential benefits of reversing or delaying progressive tissue wasting.[10-14] In addition, currently, a consensus that nutritional support is important to treat malnutrition due to cancer cachexia is growing.[15] In advanced cancer patients, effects of increased calorie intake and long-term nutritional support have been rarely investigated, and the role of nutritional support to alleviate the negative impact of cancer cachexia has not been clarified.[9,16] Furthermore, to the best of our knowledge, there has been no prospective study to investigate the effect of nutritional support for advanced cancer patients in inpatient hospices. Therefore, we conducted a prospective observational study to explore the feasibility of investigating the effect of nutritional support for advanced cancer patients in an inpatient hospice.

METHODS

The present study was conducted in an inpatient hospice at Osaka City General Hospital (Osaka, Japan) between October 2014 and September 2015.

Consecutive eligible patients were recruited for the study if they had been newly referred to the inpatient hospice during the study period. Inclusion criteria were as follows: (1) adult patients with histologically proven incurable malignancies, (2) no cognitive impairment at admission, (3) Karnofsky Performance Status (KPS)[17] of 30 or more at admission, and (4) Palliative Prognostic Index (PPI)[18] of 6.0 or less at admission. If the PPI score is greater than 6.0, survival is less than 3 weeks (sensitivity-80%; specificity-85%).[18]

Patient demographics and clinical characteristics, including age, gender, site of primary cancer, and metastatic disease, were obtained. We evaluated and recorded patients' performance status, results of blood tests, calorie and protein intake, body weight, and skeletal muscle mass on the 1st day of admission and every 2 weeks. Scores of the Functional Assessment of Anorexia/Cachexia Therapy (FAACT) questionnaire,[19] which has been validated to assist clinicians in testing the efficacy of anti-anorexia/cachexia therapies, were collected as well. A higher score on the FAACT questionnaire indicates better quality of life. All patients were followed-up to their discharge or 4 weeks after their enrollment.

Primary endpoint was percentage of patients who completed the intervention. Secondary endpoints were overall survival and improvement of KPS score in the 2nd week. We defined improved KPS score as an increase by 20 points or more, deteriorated score as a decrease by 20 points or more, and other changes in score as maintaining. Subgroup analysis was performed by dividing patients into 3 groups with regard to their changes of KPS score in the 2nd week (improving, maintaining, and deteriorating KPS groups). Overall survival was compared and changes in nutrition indexes, calorie and protein intake, and quality of life (i.e., FAACT scores) were also investigated between the 3 groups.

The present study was conducted in accordance with the ethical standards of the Helsinki Declaration and the ethical guidelines for epidemiological research established by the Ministry of Health, Labor and Welfare (MHLW) in Japan, and approved by the Institutional Review Board (IRB) at Osaka City General Hospital. We obtained written informed consent before enrolling participants.

Interventions

As a part of routine clinical practice in our inpatient hospice, attending physicians ask patients whether they want to receive help from a nutritional support team. In the present study, if the patient agreed to receive such help, a nutritional support team, consisting of trained physicians, dietitians, pharmacists, and nurses, provided individualized and tailored nutritional support to the patient. When the amount of oral intake of the patient was under half, the patient was monitored daily. The goal of the nutritional support was to meet or exceed the energy and protein requirements of the Nordic recommended allowances[20] (daily energy intake in the range of 1.5-1.7×basal energy expenditure (BEE), calculated from the Harris-Benedict equation,[21] and protein intake of 1.0-1.2 g/kg body weight). The intervention included the following: (1) exploring the causes of malnutrition (e.g., decreased oral intake, hypermetabolism); (2) palliating symptoms (e.g., anorexia, nausea, vomiting, constipation, diarrhea, odynophagia, dysphagia); (3) giving patients explanations on cancer cachexia, encouraging patients with feeding, and supporting the nurses in this role; (4) offering dietary foods and supplements, including high omega-3 fatty acids and branched chain amino acids; and (5) administering total parenteral nutrition or peripheral parenteral nutrition, if indicated and agreed to.

Body Composition Analysis

We introduced body composition analysis into nutritional assessment using bioelectrical impedance analysis (BIA). BIA measures the body's resistance to flow (impedance) of alternating electrical current at a designated frequency between points of contact on the body. Water in body tissue is conductive; therefore, the measurement of body impedance can indirectly provide information on the body's tissue content, including total body water, fat-free mass, and skeletal muscle mass.[22-24]

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In preparation for BIA, patients fasted for at least 3 hours and voided immediately before starting the analysis. By using the InBody 770 (InBody Japan, Tokyo, Japan), various parameters, including body weight and skeletal muscle mass, can be automatically and simultaneously measured within 1 minute. The skeletal muscle mass is shown as a percent against the standard calculated by age, sex, and height of each patient. The normal skeletal muscle mass range is 90-110% of the standard. In the present study, we calculated the decrease rate of skeletal muscle mass as (the lower limit of the normal-the measured value)/the lower limit of the normal×100.

Statistical Analysis

Comparisons were performed using the Kruskal-Wallis test. Survival after enrollment was investigated by the Kaplan-Meier method. All results were considered to be statistically significant if the *p* value was less than 0.05. All analysis was performed using IBM SPSS v. 22.0 (SPSS Inc., Chicago, IL, USA).

We calculated sample size needed as follows: given 80% of completion rate this intervention was feasible, adequate sample size was 39 with interval of 0.25 both side in 95% confidence interval (CI).

RESULTS

In the present study, 344 consecutive patients newly referred to the inpatient hospice during the study period were enrolled. A total of 43 patients met the inclusion criteria, and among them, 14 refused to participate. Thus, 29 were analyzed in the present study. Patient characteristics are shown in Table 1. Mean age was 69.6±6.8 years old, and male gender accounted for 62.1%. The top sites of primary cancer were the lung, upper and lower gastrointestinal tracts, and biliary system and pancreas. The distribution of KPS scores was as follows: 100-80, 3.4%; 70-50, 86.2%; and 40-30, 10.3%.

The percentage of patients who completed the interven-

	Total (n=29)	Improving KPS (n=12)	Maintaining KPS (n=9)	Deteriorating KPS (n=8)	*p*
Age (years)	69.6±6.8	68.7±7.0	70.7±7.0	69.8±6.9	0.802
Male gender	18 (62.1%)	6 (50.0%)	6 (66.7%)	6 (75.0%)	0.511
Site of primary cancer					
Lung	10 (34.5%)	4 (33.3%)	3 (33.3%)	3 (37.5%)	0.892
Upper and lower gastrointestinal tracts	7 (24.1%)	4 (33.3%)	0 (0.0%)	3 (37.5%)	
Biliary system and pancreas	5 (17.2%)	0 (0.0%)	5 (55.6%)	0 (0.0%)	
Breast	3 (10.3%)	3 (25.0%)	0 (0.0%)	0 (0.0%)	
Urological	2 (6.9%)	1 (8.3%)	0 (0.0%)	1 (12.5%)	
Head and neck	1 (3.4%)	0 (0.0%)	1 (11.1%)	0 (0.0%)	
Hematological	1 (3.4%)	0 (0.0%)	0 (0.0%)	1 (12.5%)	
Metastatic disease					
Bone	15 (51.7%)	8 (66.7%)	2 (22.2%)	5 (62.5%)	0.109
Lung	9 (31.0%)	4 (33.3%)	3 (33.3%)	2 (25.0%)	0.913
Brain	8 (27.6%)	3 (25.0%)	3 (33.3%)	2 (25.0%)	0.901
Liver	7 (24.2%)	1 (8.3%)	4 (44.4%)	2 (25.0%)	0.170
Body mass index (kg/m^2)	20.1±3.2 (n=26)	20.4±2.8	21.2±3.5 (n=8)	18.1±3.1 (n=6)	0.180
Decrease rate of skeletal muscle mass	-9.5±15.8 (n=23)	-5.0±15.8 (n=11)	-9.3±16.6 (n=6)	-18.2±14.0 (n=6)	0.151
Palliative prognostic index	3.5±1.3	3.1±1.4	3.8±1.2	3.6±1.2	0.440
KPS					
100-80	1 (3.4%)	0 (0.0%)	0 (0.0%)	1 (12.5%)	0.096
70-50	25 (86.2%)	10 (83.3%)	8 (88.9%)	7 (87.5%)	
40-30	3 (10.3%)	2 (16.7%)	1 (11.1%)	0 (0.0%)	
Serum concentrations					
Hemoglobin (g/dl)	10.7±2.4	11.1±2.5	10.1±2.2	10.8±2.5	0.718
Total lymphocyte count (/μl)	1300±692	816±306	1740±596	1530±812	0.002
Albumin (g/dl)	2.9±0.5	3.0±0.4	2.7±0.6	3.0±0.4	0.292
Transthyretin (mg/dl)	13.6±6.9	16.2±7.4	11.5±5.1	12.0±7.5	0.232
C-reactive protein (mg/dl)	3.8±3.5	3.3±4.5	4.6±3.2	3.7±2.0	0.203

Values represent mean±standard deviation or n (%) where appropriate.
KPS: Karnofsky Performance Status.

Table 1: Baseline patient characteristics.

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tion in the 2nd week was 93.1% (95% CI 78-98%), and that in the 4th week was 44.8% (95% CI 28-63%), in other words, the end-of-study attrition rate was 55.2% (95% CI 37-72%). Sixteen patients out of 29, 55.2% (95% CI 37-72%), were alive 4 weeks after their enrollment. Two patients died within 2 weeks, and 3 patients were discharged to home and 11 patients died between the 3rd and 4th weeks. Patients flow through the study is outlined (Figure 1). The KPS improvement rate in the second week was 41.4% (95% CI 25-59%), while the maintained rate and deterioration rate were 31.0% (95% CI 17-49%) and 27.6% (95% CI 15-46%), respectively.

We then divided the 29 patients into 3 groups with regard to their changes of KPS score in the 2nd week: improving KPS group (n=12), maintaining KPS group (n=9), and deteriorating KPS group (n=8). All items, except for total lymphocyte count, were not significantly different between the 3 groups (Table 1).

Waterfall plots of changes in KPS from baseline to the 2nd week are shown in Figure 2. In the improving KPS group, all of the 12 patients were alive 4 weeks after their enrollment and 3 patients were discharged to home between the 3rd and 4th weeks. In the maintaining KPS group, 4 patients were alive 4 weeks after their enrollment and 5 patients died between the 3rd and 4th weeks. In the deteriorating KPS group, 2 patients died within 2 weeks and 6 patients died between the 3rd and 4th weeks.

Kaplan-Meier survival curves for overall survival of the 3 groups are shown in Figure 3. Survival after enrollment decreased with deterioration of KPS score. The difference in survival rates between the 3 groups was statistically significant (p<0.001).

Changes in KPS, nutrition indexes, calorie and protein intake, and FAACT scores are shown in Table 2. Concerning body mass index (BMI), all values in the improving KPS group

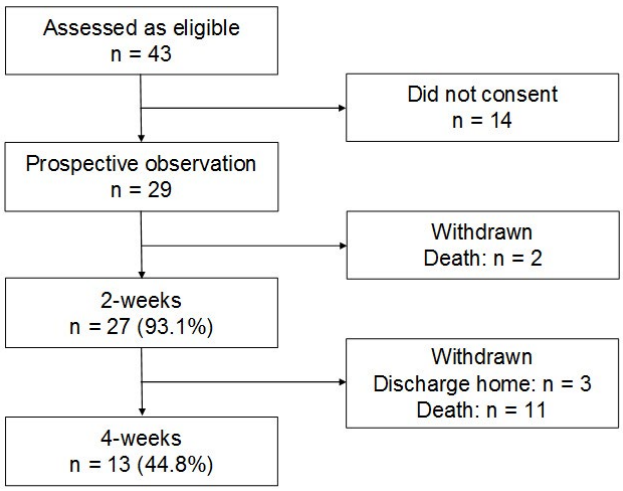

Figure 1: Patients flow through the study. The percentage of patients who completed the intervention in the second week was 93.1% (95% CI 78-98%), and that in the 4th week was 44.8% (95% CI 28-63%). Sixteen patients out of 29, 55.2% (95% CI 37-72%), were alive 4 weeks after their enrollment. Two patients died within 2 weeks, and 3 patients were discharged to home and 11 patients died between the 3rd and 4th weeks.

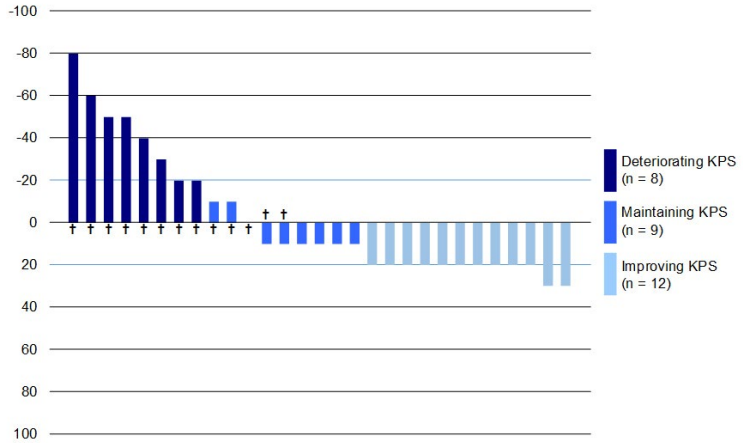

Figure 2: Waterfall plots of changes in Karnofsky Performance Status (KPS) from baseline to the 2nd week are shown. The improvement rate in KPS in the 2nd week was 41.4% (95% CI).

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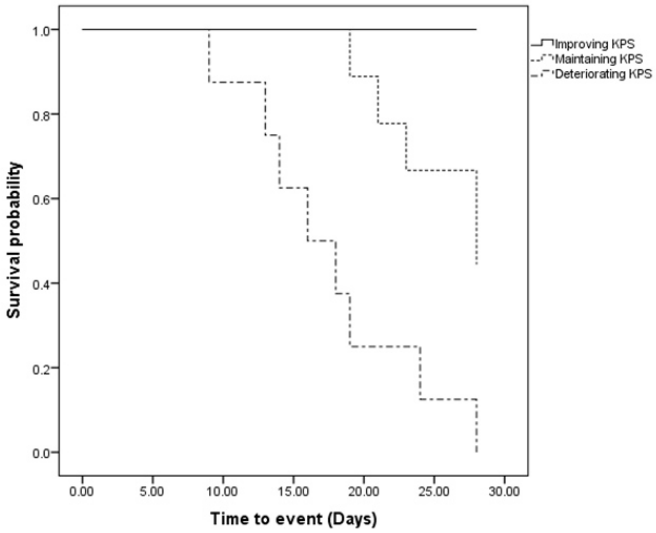

Figure 3: Kaplan-Meier plot (Log-rank p<0.001)
Kaplan-Meier survival curves for overall of three groups: the improving karnofsky performance status (KPS) group (n=2), the maintaining KPS group (n=8). Survival after enrollment decreased with deteriorating KPS (n=8). Survival after enrollment decreased with deteriorating KPS. The difference in survival rates among the three groups was statistically significant (p<0.001).

		Baseline	2-weeks	4-weeks
KPS	Total (n=29)	50 (40-80) (n=29)	60 (0-90) (n=29)	10 (0-80) (n=26)*
	Improving KPS (n=12)	50 (40-70) (n=12)	80 (60-90) (n=12)	50 (10-70) (n=9)*
	Maintaining KPS (n=9)	50 (40-70) (n=9)	60 (40-70) (n=9)	10 (0-80) (n=9)
	Deteriorating KPS (n=8)	70 (50-80) (n=8)	20 (0-50) (n=8)	0 (0-10) (n=8)
Body mass index (kg/m^2)	Total (n=29)	20.1±3.2 (n=26)	20.3±2.8 (n=19)	20.8±3.1 (n=7) *
	Improving KPS (n=12)	20.4±2.8 (n=12)	20.5±2.7 (n=12)	20.4±3.2 (n=6) *
	Maintaining KPS (n=9)	21.2±3.5 (n=8)	20.0±3.4 (n=6)	23.3±0.0 (n=1)
	Deteriorating KPS (n=8)	18.1±3.1 (n=6)	18.8±0.0 (n=1)	
Decrease rate of skeletal muscle mass (%)	Total (n=29)	-9.5±15.8 (n=23)	-8.3±15.2 (n=15)	-9.8±6.6 (n=6)*
	Improving KPS (n=12)	-5.0±15.8 (n=11)	-5.9±14.8 (n=12)	-9.8±6.6 (n=6)*
	Maintaining KPS (n=9)	-9.3±16.6 (n=6)	-18.1±15.1 (n=3)	
	Deteriorating KPS (n=8)	-18.2±14.0 (n=6)		
Total lymphocyte count (/μl)	Total (n=29)	1300±692 (n=29)	1314±714 (n=25)	1176±651 (n=16)*
	Improving KPS (n=12)	816±306 (n=12)	976±364 (n=12)	892±285 (n=9)*
	Maintaining KPS (n=9)	1740±596 (n=9)	1886±862 (n=9)	1587 ±889 (n=6)
	Deteriorating KPS (n=8)	1530±812 (n=8)	1043±273 (n=4)	1273±0 (n=1)
Albumin (g/dl)	Total (n=29)	2.9±0.4 (n=29)	2.7±0.6 (n=25)	2.7±0.7 (n=15)*
	Improving KPS (n=12)	3.0±0.4 (n=12)	2.9±0.4 (n=12)	2.8±0.4 (n=9)*

ISSN 2377-8393 Open Journal http://dx.doi.org/10.17140/PMHCOJ-2-117

	Maintaining KPS (n=9)	2.7±0.6 (n=9)	2.6±0.7 (n=9)	2.6±0.9 (n=6)
	Deteriorating KPS (n=8)	3.0±0.4 (n=8)	2.6±0.4 (n=4)	
Transthyretin (mg/dl)	Total (n=29)	13.6±6.9 (n=29)	13.8±6.3 (n=25)	12.1±7.4 (n=15) *
	Improving KPS (n=12)	16.2±7.4 (n=12)	15.6±6.0 (n=12)	12.9±7.7 (n=9) *
	Maintaining KPS (n=9)	11.5±5.1 (n=9)	14.0±6.1 (n=9)	10.9±7.5 (n=6)
	Deteriorating KPS (n=8)	12.0±7.5 (n=8)	7.8±5.4 (n=4)	
C-reactive protein (mg/dl)	Total (n=29)	3.8±3.5 (n=29)	5.0±5.5 (n=25)	7.0±7.1 (n=16) *
	Improving KPS (n=12)	3.3±4.5 (n=12)	2.8±2.8 (n=12)	5.2±4.8 (n=9) *
	Maintaining KPS (n=9)	4.6±3.2 (n=9)	6.0±5.9 (n=9)	9.3±10.0 (n=6)
	Deteriorating KPS (n=8)	3.7±2.0 (n=8)	9.6±8.5 (n=4)	9.38±0.0 (n=1)
Calorie /protein sufficiency rate (%)	Total (n=29)	56.0±24.7/71.3±35.2 (n=29)	64.1±36.6/75.5±45.4 (n=27)	56.4±43.1/63.9±48.6 (n=16)*
	Improving KPS (n=12)	62.2±25.6/77.4±39.3 (n=12)	89.8±16.2/105.8±25.1 (n=12)	55.6±39.4/62.6±47.4 (n=9)*
	Maintaining KPS (n=9)	60.0±24.4/77.0±34.1 (n=9)	63.8±29.0/75.5±36.3 (n=9)	66.4 ±4 9.0/76.6±49.7 (n=6)
	Deteriorating KPS (n=8)	42.0±20.6/55.9±28.7 (n=8)	13.1 ±18.1/15.1±25.6 (n=6)	3.3±0.0/0.0±0.0 (n=1)
FAACT, Total/ Anorexia cachexia subscale	Total (n=29)	76.6±14.5/22.6±7.8 (n=29)	78.0±19.6/24.1±9.9 (n=22)	68.8±16.6/20.9±10.3 (n=11)*
	Improving KPS (n=12)	77.2±18.5/21.0±7.4 (n=12)	81.8±21.4/25.2 ±10.6 (n=12)	66.1±12.6/19.1±8.9 (n=7)*
	Maintaining KPS (n=9)	82.1±11.1/25.2±8.9 (n=9)	75.9±17.9/23.8±10.4 (n=8)	73.5±23.6/24.0±13.1 (n=4)
	Deteriorating KPS (n=8)	69.5±8.3/21.9±7.2 (n=8)	63.5±12.0/19.0±2.8 (n=2)	

Values represent median (range) or mean±standard deviation.
*: In the improving KPS group 3 patients were discharged to home between the third and fourth weeks.
KPS: Karnofsky Performance Status, FAACT: The Functional Assessment of Anorexia/Cachexia Therapy.

Table 2: Changes in KPS, nutrition indexes, calorie and protein intake, and scores of FAACT.

and maintaining KPS group were over 20.0 kg/m^2 throughout the study. Concerning the decrease rate of skeletal muscle mass, all values in the improving KPS group were under 10.0% throughout the study. Changes in total lymphocyte count were inconsistent. Although changes in albumin and transthyretin (TTR) trended downward, the values of transthyretin in the 2nd week of patients in the maintaining KPS group temporarily increased. Although changes in C-reactive protein trended upward, the values in the second week of patients in the improving KPS group temporarily decreased. Calorie/protein sufficiency rate in the second week of patients in the improving KPS group temporarily increased, while that in the deteriorating KPS group highly decreased. Scores of FAACT in the 2nd week of patients in the improving KPS group slightly improved.

DISCUSSION

To the best of our knowledge, this is the 1st report of a prospective observational study to explore the feasibility of investigating the effect of nutritional support for advanced cancer patients in an inpatient hospice.

The present study indicates the feasibility of conducting trials to investigate the effect of nutritional support for advanced cancer patients in an inpatient hospice. Especially, the percentage of patients who completed the intervention in the second week was 93.1% (95% CI 78-98%). The end-of-study attrition rate was 55.2% (95% CI 37-72%), similar to the result of a previous study,[25] where it was 44% (95% CI 41-47%).

We must take into account frailty and short survival in advanced cancer patients in designing multicenter randomized controlled trials in palliative care settings. Values of KPS, blood tests, and calorie/protein sufficiency rate are more easily obtained than those of body mass index and decrease rate of skeletal muscle mass, because patients with impending death are incapable of measurement of body weight and skeletal muscle mass. Therefore, we consider that improvement of KPS score in the second week is a candidate for a primary endpoint to minimize patient withdrawal due to death and progression of the

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underlying disease, despite the possibility of underestimation the effects of nutritional support due to short observation periods. Furthermore, KPS is often affected by many other issues (e.g. treatment of any reversible conditions unrelated to cancer cachexia such as pneumonia) in addition to cancer cachexia, while KPS is associated with nutritional and general status of advanced cancer patients and is one of the most important factors to estimate them.

Results of the present study imply that advanced cancer patients who recover their performance status may have longer survival than those who do not, and that increased calorie and protein intake by nutritional support may be linked to improvement in their performance status and quality of life. However, the association between calorie and protein intake, performance status, and skeletal muscle mass is unclear as well as the determinants of improving performance status and quality of life in advanced cancer patients.

Skeletal muscle depletion has been uniformly a strong predictor of survival independent of age, gender, stage, disease site, and performance status in cancer patients.[26-28] Tailored nutritional support for selective advanced cancer patients with the aim of keeping or gaining skeletal muscle mass, a kind of individualized anti-cancer cachexia therapy, may be linked to better performance status and longer survival even in palliative care. In addition, it is necessary to consider the influence of age and gender on performance status and skeletal muscle mass. Skeletal muscle depletion is associated with aging in cancer patients,[29] while the results on gender of previous studies have been inconsistent. A study of advanced cancer patients concluded that gender was not related to muscle wasting or gain,[30] while male pancreatic cancer patients lost more muscle and at an accelerated rate compared with females.[31]

Further research is needed to examine the relationship between nutritional support and influence of age and gender on performance status and skeletal muscle mass in advanced cancer patients.

There are several limitations to be acknowledged. First, the findings are not definitive and cannot be generalized because it was a single-arm and single-institution study with a modest sample size. This was a preliminary study, and a RCT to reveal the effect of nutritional support for advanced cancer patients is warranted. Second, there might be heterogeneity of intervention and patient reaction. The intervention included encouraging patients with feeding, offering dietary foods and supplements, and administering parenteral nutrition; hence, the effects of oral nutritional supplementation and those of parenteral nutrition were mixed. We believe that the clinical implications were not affected, however, because we administered "supplemental" parenteral nutrition to patients who became unable to take sufficient nourishment orally as usual care. Third, several subjects consumed supplements, including high omega-3 fatty acids and branched chain amino acids. The use of these supplements for formulation may lead to gaining skeletal muscle mass; the effects of these should therefore be taken into consideration. Fourth, alleviating symptoms might have contributed to improvement in performance status. However, we believe that the clinical implications were not affected, because we usually do our best to alleviate symptoms for every patient as a part of routine clinical practice in an inpatient hospice. Fifth, the effects of long-term nutritional support for advanced cancer patients are unclear due to the 4 weeks of observation in the present study. Finally, we initially calculated sample size needed as follows; given 80% of completion rate this intervention was feasible; adequate sample size was 39 with interval of 0.25 both side in 95% confidence interval. Actually due to difficulty in recruitment, this study was ended after a total of 29 patients were recruited.

CONCLUSION

The present study indicates the feasibility of conducting trials to investigate the effect of nutritional support for advanced cancer patients in palliative settings as well as the potentiality of the effect of nutritional support for them. Further research should be conducted in the near future.

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CONFLICTS OF INTEREST

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