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Original research

EFFECTIVENESS OF REMOTE DIETARY COUNSELING INTERVENTION ON CANCER PATIENTS WITH ENTERAL TUBE FEEDING UNDERGOING CHEMOTHERAPY

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ABSTRACT

Background: *Hue Central Hospital is a special-grade central - level hospital that has been and is promoting comprehensive patient care. The teamwork between treating physicians, nursing care, clinical pharmacists and nutritionists has initially shown positive patient treatment outcomes. Recognizing that cancer patients frequently enter and exit the hospital between chemotherapy cycles, remote nutritional counseling intervention is an effective measure to help patients adhere to a reasonable diet at home and prepare their physical condition for the next chemotherapy cycle. Therefore, we conducted this study to evaluate the effectiveness of remote nutritional counseling intervention on cancer patients with enteral feeding undergoing chemotherapy at the Oncology Center, Hue Central Hospital.*

Methods: *A non - controlled interventional dietary study was conducted on 22 patients diagnosed with cancer and admitted for multiple chemotherapy cycles with enteral feeding indication at Hue Central Hospital Cancer Center from January to April 2024.*

Results: *The nutritional status characteristics of the study subjects according to the clinical index Albumin < 25g/L accounted for 4.5%; BMI < 18.5 accounted for 27.3% and 90.9% of patients were assessed as malnourished according to PG-SGA. After nutritional intervention, most patients had positive changes in anthropometric and clinical parameters ($p > 0.05$).*

Conclusions: *Remote home - based dietary intervention has demonstrated positive effects for patients.*

Keywords: *Remote dietary counseling, Cancer, Enteral tube feeding, Hue Central Hospital.*

I. BACKGROUND

Cancer has become a severe public health issue that is increasingly prevalent globally, including in Vietnam, resulting in a high mortality rate [1]. Metabolic changes in patients lead to increased energy expenditure and cachexia [2]. Moreover, cancer treatment often accompanies side effects and complications that affect the patient's digestive system, such as nausea, vomiting, loss of appetite, mucositis, and diarrhea. Over 85% of cancer patients experience weight loss or malnutrition during treatment, and alarmingly, 50% are already malnourished at diagnosis [2].

Nutrition plays a critical role in cancer treatment. Nutritional deficiencies can lead to serious consequences for cancer patients, including reduced treatment efficacy, decreased quality of life, impaired bodily functions, increased risk of complications, and treatment interruptions [3, 4]. Studies indicate that more than half of cancer patients do not receive adequate energy and nutrients, leading to severe deficiencies, potentially up to 80% [2].

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Enteral feeding via a tube is an effective nutritional delivery method for cancer patients unable to consume adequate oral intake. While there have been many nutritional intervention studies for cancer patients worldwide and domestically, few focus on cancer patients undergoing chemotherapy with enteral feeding. At Hue Central Hospital, a special national hospital, comprehensive care for patients is being emphasized. The 2010 doctoral thesis by Vu Thi Bac Ha on the nutritional efficacy of a homemade high - energy solution for early enteral feeding in critically ill patients has shown positive treatment outcomes [5].

Recognizing that cancer patients frequently visit the hospital between chemotherapy sessions, remote nutritional counseling is an effective measure to help patients adhere to a proper diet at home and prepare for the next treatment phase. Therefore, we conducted this study to evaluate the effectiveness of remote nutritional counseling interventions on cancer patients receiving enteral feeding while undergoing chemotherapy at the Cancer Center, Hue Central Hospital.

II. MATERIALS AND METHODS

From January to April 2024, we carried out a prospective intervention study without a control group in 22 patients aged 18 and over diagnosed with cancer confirmed by pathological anatomy, with complete archived records, undergoing chemotherapy, indicated for enteral feeding via a tube or combined oral feeding, with or without comorbidities. A convenience sampling method was used, with patients or their relatives agreeing to participate in the study.

Patient medical records, nutritional status assessment forms; scales and height measuring devices; research medical records with clinical and paraclinical data; telephones, laptops/computers.

Patients selected for the study group were assessed for nutritional status, anthropometric indices, and some paraclinical indicators (Albumin, Red blood cells, hemoglobin) before preparing for discharge after any chemotherapy session. After classifying the nutritional status, patients were planned for nutritional counseling intervention by the Nutrition Department's doctors and guided and monitored for home nutritional care by nurses, aiming to maintain and improve physical condition for the next chemotherapy session.

Nutritional intervention goals for patients: to meet the needs of approximately E ≈ 30 - 35kcal/kg/day protein 1.2 - 1.5g/kg/day, balancing other nutritional components. The intervention regimen was individualized for each patient, including main meals and snacks, with enteral feeding being the primary method. Before going home, patients were specifically instructed by the Nutrition Department on the high - energy Soup formula 1ml: 1Kcal or 1ml: 1.5Kcal, 100 ml/ 5 - 7g Protid, and provided with counseling materials, menus for 4 - 8 meals over 7 days. We monitored patients via phone twice a week on Mondays and Thursdays to assess and guide dietary adjustments. Additionally, patients and their relatives could contact us anytime if they encountered any difficulties or questions during home nutritional care.

We evaluated patients at two-time points: T0: when patients were preparing for discharge; T1: after remote nutritional counseling intervention when patients had an appointment to return for the next chemotherapy session, assessing anthropometric indices, paraclinical indices, and the risk of malnutrition using the PG-SGA toolkit.

Data were cleaned and entered using Excel software and analyzed with SPSS 20. Qualitative variable values were presented as frequency and percentage. Quantitative variables were presented as mean and standard deviation. The relationship between two variables was determined using appropriate statistical tests. A statistically significant difference was considered when the p-value was < 0.05.

Patients voluntarily participated in the study and had the right to withdraw at any time. Patients were fully informed of the benefits and rights of participating in the study. Information collected from the study subjects was used solely for research purposes.

III. RESULTS

Table 1 shows that the majority of the study subjects are male (68.2%), with females making up 31.8%; the age group from 45 to 65 has the highest percentage at 59.1%. Most of the study subjects live in urban areas (72.7%) and have an economic status

that is sufficient for living (86.4%). There are 50% of the study subjects diagnosed with esophageal cancer, followed by stomach cancer (36.4%), colon cancer (9.1%), and malignant tonsils (4.5%). The patients diagnosed at stage IV constitute the majority (45.5%), followed by stage III (40.9%) and stage II (13.6%), where the treatment modality of surgery combined with chemotherapy is the most common (68.2%). There are 4 study subjects with comorbidities.

Table 1: Patient Overall Characteristics

Characteristics		**Number (N=22)**	**Percentage (%)**
Gender	Male	15	68.2
	Female	7	31.8
Age	Under 45	5	22.7
	45 to 65	13	59.1
	Over 65	4	18.2
Living area	Rural	6	27.3
	Urban	16	72.7
Economic status	Making ends meet	19	86.4
	Impoverished	3	13.6
Diagnosis	Esophageal cancer	11	50.0
	Stomach cancer	8	36.4
	Malignant tonsils	1	4.5
	Colon malignancies	2	9.1
Stage of disease	Stage II	3	13.6
	Stage III	9	40.9
	Stage IV	10	45.5
Treatment modality	Chemotherapy	1	4.5
	Surgical chemotherapy	15	68.2
	Surgical radiotherapy	6	27.3
Comorbidities	Yes	4	18.2
	No	18	81.8

The figure 1 shows the nutritional status characteristics of the study subjects according to the clinical index of Albumin < 25g/L, which accounts for 4.5%. Most of the study subjects are assessed with a BMI from 18.5 to 25, comprising 68.2%, and 72.7% of patients are evaluated with a nutritional status of PG-SGA B.

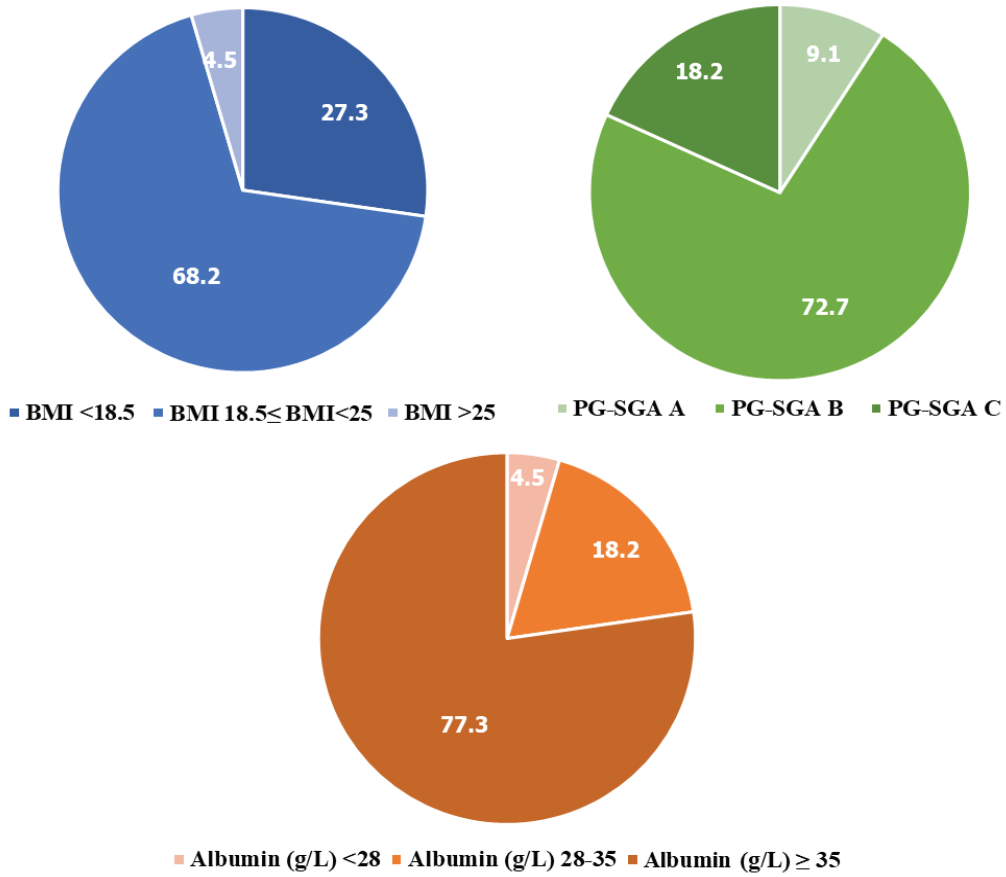

Figure 1: Proportion of nutritional status indicators based on BMI, PG-SGA, and Albumin

Table 2 shows that the average number of daily meals is 5.9 ± 0.6. During the intervention period of counseling and monitoring nutritional care at home, there were 2 study subjects who experienced reflux, and 1 subject had diarrhea.

Table 2: Nutritional care at home for study participants following a week of telehealth dietary advice

Feeding characteristics	Nourishment status			
	Yes		No	
	Number (N=22)	Percentage (%)	Number (N=22)	Percentage (%)
Average number of meals/day	5.9 ± 0.6			
Reflux condition	2	9.1	20	90.9
Diarrhea	1	4.5	21	95.5

Figure 2 shows that the average total energy intake over 7 days ranged from 1386.4 Kcal to 1650 Kcal, and the average protein intake varied from 57.8 g to 69 g. The total energy and protein intake gradually increased over the 7 days, peaking on day 7.

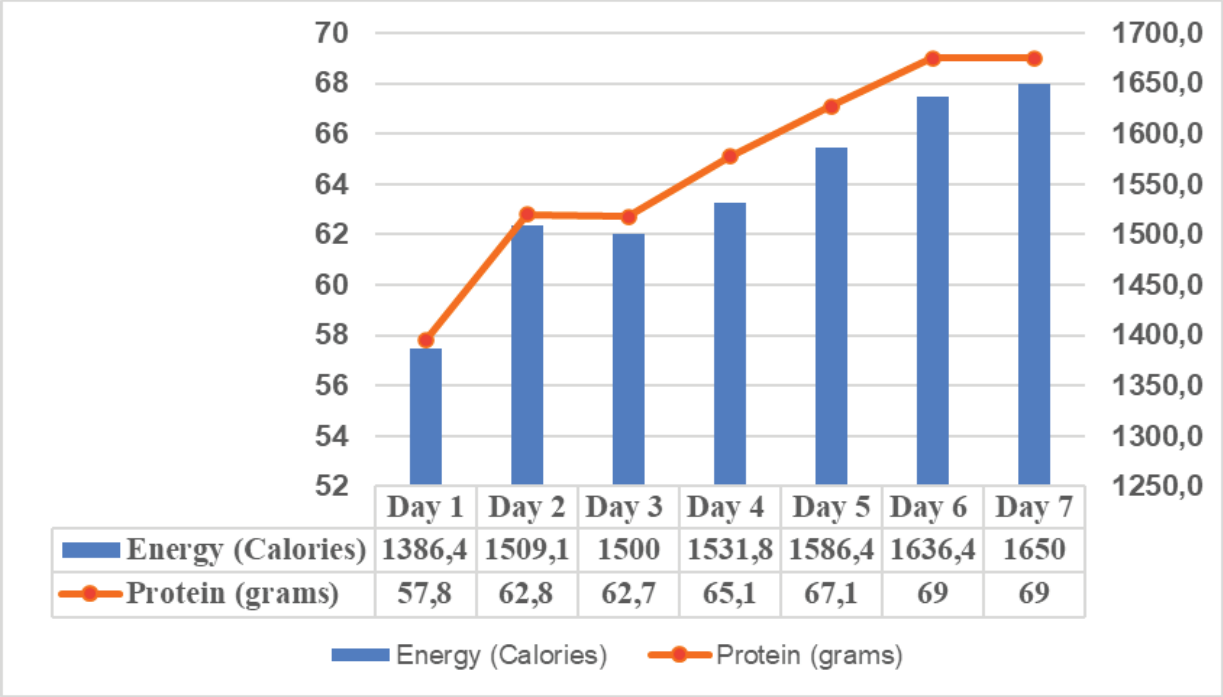

Figure 2: Total average energy and protein over 7 days

Table 3 shows that most of the anthropometric and clinical indices of the research subjects increased after the nutritional intervention. The proportion of patients with an average Albumin index decreased, and there is a statistically significant correlation between the average Albumin index before and after evaluation ($p < 0.05$)

Table 3: Evaluation of the effectiveness of remote nutritional counseling intervention based on anthropometric and clinical indices.

Indicators		**T0 (X±SD)**	**T1 (X±SD)**	**p**
Anthropometric indices	Average weight (kg)	51.5 ± 10.1	52.3 ± 8.9	0.084
	BMI (kg/m^2)	19.3 ± 3.1	19.6 ± 2.7	0.068
Clinical indices	Albumin (g/L)	38.4 ± 5.6	35.9 ± 5.9	0.008
	Red blood cells (T/l)	4.1 ± 0.6	4.1 ± 0.5	0.906
	Hemoglobin (g/l)	11.9 ± 1.6	12.1 ± 2.7	0.613

Table 4 shows that the percentage of patients assessed with the PG-SGA A nutritional status classification increased from 9.1% to 13.6%. However, no statistically significant correlation exists between the nutritional status classification according to PG-SGA before and after the assessment ($p > 0.05$).

Table 4: Evaluation of the Effectiveness of Remote Nutritional Counseling Intervention based on the PG-SGA Toolkit

Toolkit		**T0 (n, %)**	**T1 (n, %)**	**p**
PG - SGA	A	2 (9.1)	3 (13.6)	1.000
	B + C	20 (90.9)	19 (86.4)	

IV. DISCUSSION

In our study, most subjects were male (68.2%), with females accounting for 31.8%, and the majority fell into the age group of 45 - 65, which accounted for the highest proportion at 59.1%. This rate is quite similar to the study by author Phạm Nguyên Tường in 2017 [6]. Most of the study subjects lived in urban areas with sufficient economic status, which also had a certain impact on the process of home nutritional care for patients. All the study subjects we selected were diagnosed with cancer in the gastrointestinal tract, and patients experienced difficulties in oral nutrition, combined with treatment modalities including chemotherapy and radiotherapy, leading to patients being unable to eat, consuming less food, and having poorer nutritional status. Therefore, after the indication for gastric decompression, nutritional intervention and dietary advice for patients were very necessary, especially when patients were discharged from the hospital and took care of nutrition at home before the next chemotherapy sessions.

The degree of malnutrition before nutritional intervention based on BMI showed that most patients had a normal BMI, accounting for 68.2%, with 27.3% of patients classified as malnourished. This average body mass index is similar to other studies on cancer patients in the North by author Tran Thi Bich Hai [7] and author Vũ Thị Trang and colleagues [8]. Our study found that 4.5% of patients lacked Albumin in the blood, which is lower than the study by author Lê Thị Thu Hà [9] and the study by author Nguyen Thi Huong Quynh at the Cancer Center and Nuclear Medicine Hospital 103 in 2018 on nutrition of cancer patients treated with chemicals, which had 21.4% lacking Albumin [10]. The rate of malnutrition according to PG-SGA was 90.9%, higher than the study by authors Nguyen Thi Thuy Luong at 73.2% [11]; the study by Lê Thị Thu Hà at 39% [9]; and the study by Nguyen Thuy Linh at the start of the study with the rate of malnutrition according to PG-SGA at 77.4% [2]. This difference may be due to several factors, such as the type of cancer, treatment methods, or nutritional status accompanied by the patient's attitude and adherence to the nutritional regimen.

In our study, the study subjects were provided with a feeding tube menu with an average number of meals per day of 5.9 ± 0.6, in addition to the main meals being high - energy Soup, which had been instructed by the Nutrition Department, patients would use additional meals (fruit juice, milk). The 24-hour portion of the study subjects had an average energy value ranging from 1386.4 Kcal to 1650 Kcal, and the average protein intake ranged from 57.8 g to 69 g. During the home nutritional care monitoring process, there were some cases where energy intake was less than 500-700kcal/day, the reasons for the reduction in the patient's food intake were recorded: diarrhea (4.5%) and reflux (9.1%). In the study results of author Tran Thi Anh Tuong, the average 24 - hour energy intake was calculated to be about 1300 kcal [12] and the study by Đào Thị Thu Hoài was 1327 kcal/day [13].

The effectiveness of nutritional intervention was assessed by changes in weight, average BMI, some clinical indices, and the PG-SGA assessment toolkit at two time points T0, T1. The results of our study showed that the rate of patients with an average Albumin index decreased over two time points and there was a statistically significant correlation between the average Albumin index before and after assessment ($p < 0.05$). Serum Albumin can detect higher nutritional deficiencies than BMI because the half - life of albumin is short at 20 days, however, serum albumin concentration can be affected by many factors including accompanying diseases such as liver failure, kidney failure, type of cancer, infection status, etc. [2]. Although the average Albumin rate in our study decreased, it still reached over 35g/L (35.9 ± 5.9).

The rate of patients with an average weight index increased from 51.5 ± 10.1 to 52.3 ± 8.9 before and after assessment, reflecting an improvement in the nutritional status of patients during the intervention, however, there was no statistically significant correlation ($p > 0.05$). In the study by Nayel H and colleagues on the effect of nutritional supplementation for head and neck cancer patients undergoing radiotherapy, it showed that all patients receiving nutrition gained weight. Conversely, 58% of patients who did not receive nutritional supplementation lost weight with a significant statistical difference ($p = 0.001$) [14]. A meta - analysis study on 17 available data

showed that nutritional intervention support helped the intervention group gain an average of 0.6 kg (95% CI 0.21 - 1.02) compared to the control group [15]. Our study showed a difference in the level of PG-SGA over time in which the rate of patients assessed with PG-SGA A increased from 9.1% to 13.6%, however, this result was not statistically significant. This result is also similar to the study by author Hoàng Việt Bách and colleagues with the rate of patients assessed with PG-SGA A gradually increasing from 26.47% to 44.12% ($p > 0.05$) [16]; and the study by author Nguyễn Thuỳ Linh after 2 months of intervention, the rate of malnutrition according to PG-SGA decreased from 77.4% to 35.9% [2].

V. CONCLUSION

Our study shows that malnutrition in cancer patients is a fairly common issue not only at the time of hospital admission but also a burden for patients throughout the treatment period (with 95.5% of patients being assessed as malnourished according to the PG-SGA toolkit). The study subjects after nutritional intervention mostly had positive changes in anthropometric and clinical indices ($p > 0.05$). Therefore, cancer patients need to be regularly screened, evaluated, counseled, and provided with nutritional interventions during the treatment process to help improve their nutritional status, alleviate clinical symptoms, and enhance their quality of life.

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