



## Effects of Administering Dietetics to Cancer Patients Receiving Radiotherapy on Preventing and Decreasing Malnutrition

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### Abstract

*The aim of this research was to determine the effect of dietetics in preventing and reducing malnutrition in cancer patients receiving radiotherapy. This study enrolled 147 cancer patients receiving radiotherapy who had just started treatment at Inonu University, Malatya, Turkey. All of the enrolled patients had just started radiotherapy, could communicate readily, and agreed to take part in the study. The data were obtained using patient information sheets, the Subjective Global Assessment Scale (SGA), and anthropometric measurements. Weight measurements were performed in the experimental group after education and revealed that weight increased in 23% of patients, decreased in 40.5%, and remained stable in 36.5% of subjects. In the control group, 23.3% of patients exhibited an increase in weight, 43.8% experienced a decrease, and 32.9% remained stable. Statistical analyses revealed a significant difference among groups after education ( $p < 0.05$ ). The use of dietetics (nutrition education) reduced malnutrition. Therefore, nurses should administer dietetics regularly to patients undergoing radiotherapy to reduce malnutrition.*

**Keywords:** Cancer, radiotherapy, malnutrition, education

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## Introduction

Cancer is one of the most significant health issues of our age. Due to the fact that it's seen often and has a high mortality, it has become a public issue. Because of the improvement of the diagnosis techniques and the increase in the making use of the health institutions, more cancer cases are able to be detected every year.

Globocan data published by the World Health Organization Cancer Research Agency (IARC) are used for the predictions of the cancer statistics around the world. According to these data, the cancer incidences around the world is 202 for the men and 164 for the women. Compared with the average of the Europe, the rate is 335 for the men while this rate is 250 for the women. If we make a rough estimate of the prevalence, it is thought that totally 350-400 thousand people have been diagnosed with cancer and are living today. In the region in which the study was carried out, there were totally 2115 cancer patients, according to the data in 2011 [1,2].

It is nutrition whose significance is continuously increasing and is an area in which the cooperation of different disciplines can be made. At the moment of diagnosis, the malnutrition rate among the cancer patients is 40-80 % ; and, it was detected that one of the first reasons of the deaths of the 30 % of the patients was malnutrition. The frequency of the malnutrition among the cancer patients at the advanced stages is 80 %. The weight loss before the treatment in all the patients with tumours decreases the chance of the survival. The protein calorie malnutrition seen among the oncology patients with a rate of 20-80 % is a common complication and affects survival and the quality of life [3-6].

In general, it is known that 50-60 % of the cancer patients need radiotherapy for curative and palliative purposes in the course of their diseases. Radiotherapy can lead to tiredness, nausea and vomiting and there can be a decrease in the workforce depending on the insufficiency of the nutrition. It has long been recommended that nutrition care and support be provided to the patients receiving radiotherapy and customized nutrition programmes are suggested for a better life quality [7].

Nurses should attract the attention to the education of the individuals for the increase of the health, follow the cancer protection programmes and encourage the attendance. With this

approach, it is emphasized that they can take on a responsibility for using the time effectively in early diagnosis and treatment, increasing the life quality and extending the life span [8].

The aim of this study is to determine the effect of the dietetics given the cancer patients starting radiotherapy on the prevention and decrease of the malnutrition.

## **Materials and Methods**

### *The Sample of the Study*

Our study was composed of the 147 patients who just started the treatment between September 2012 and March 2013 at Inonu University Turgut Özal Medical Center, the Department of Radiation Oncology. The study was completed with 147 patients, 74 of whom were in the experimental group and 73 of whom were in the control group.

### *Data Collecting*

The data of the study was collected through Patient Question Form, weighing machine, tape measure and the scale of Subjective Global Assessment, all of which were prepared by the researcher. The height and weight of the patients were recorded by the researcher at the clinic with a tool including the properties of measuring both height and weight. With the help of a tape measure, the circle of the arm from the area of biceps and the circle of the abdomen from the line of the umbilicus were measured .

**Patient Question Form:** The form consisted of 20 questions concerning the informative features of the patients, age, sex, marital status, education level, job, the existence of another disease, the date of lying hospital and the date of the start of the radiotherapy.

### *Subjective Global Assessment (SGA)*

The scale of Subjective Global Assessment is a clinical technique explained by depending on the anamnesis and physical treatment features. It includes medical history, changes in weight, changes in the habit of nutrition, the gastrointestinal system symptoms lasting for more than two weeks and changes in functional capacity. The major components of the SGA are the weight loss in the last 6 months and the weight loss in the last 2 weeks. During the physical examination, it is examined whether there is a loss in the subcutaneous fatty tissue, muscle

loss, ankle/scrotal edema and acid. After the parameters regarding the Subjective Global Assessment are recorded, the patient is assessed in three categories as “well-fed (A)”, “mid or doubtful malnutrition (B)” and severe malnutrition (C) [9-11].

### ***The Procedure/Intervention Carried Out***

The data from the experimental and control groups were collected by the researcher between September 2012 and March 2013 with the technique of face-to-face and through the Patient Question Form and the scale of SGA. The data between the tests were collected by the researcher after the education with the help of anthropometric measurements and the scale of SGA conducted through the methods mentioned above.

After the pre-test applications, in a quiet room at the hospital, the experimental group was given educational sessions with the technique of question-answer lasting 30 minutes on the average by the researcher, the first part of which was concerning radiotherapy and its effects, the second part of which was concerning the precautions to be taken against the adverse effects and the third part of which was concerning the prevention of the malnutrition and care.

### ***The Assessment of the Data***

In the statistical assessment of the data, the percentile range, chi-square, unidirectional variance analysis and t-test in the independent groups were used. The results were assessed with a 95 % confidence bounds and the meaningfulness was at the level of  $p < 0.05$ .

### **Results**

It was determined that, in the experimental group, 43.2 % of the patients were men, 83.8 % were married, 18.9 % were illiterate, 52.7% were secondary school graduates, 18.9 % were high school graduates, 9.5 % were university and higher institution graduates and 82.9 % were with children. On the other hand, when examined the data of the control group, it was determined that 28.8 % were women, 86.3 % were married, 88.2 % were with children, 26 % were illiterate, 54.8 % were secondary school graduates, 9.6 % were high school graduates and 9.6 % were university and higher institution graduates. When examining the average age of the patients in the study, it was determined that the average age of the group in the experimental group was  $51.16 \pm 14.90$ ; whereas, the average age of the patients in the control

group was  $57.04 \pm 13.43$ . It was detected that there was a dramatic difference in terms of statistics between the groups ( $p < 0.05$ ). It was determined that the average age of the patients in the experimental group was lower. It was established that there was not a statistically remarkable difference between the patients of the experimental and control groups in terms of sex, marital status, education level, level of income and having a job and children ( $p > 0.05$ ). The Comparison of Socail-Demographic Properties of the Patients in the Experimental and Control Groups are shown in **Table 1**.

**Table 1.** The Comparison of Socail-Demographic Properties of the Patients in the Experimental and Control Groups

	<b>Experimental</b>	<b>Control</b>	
<b>Parameters</b>	<b>n (%)</b>	<b>n (%)</b>	<b>P</b>
<b>Gender</b>			
Male	42 (56.8)	34 (28.8)	.368
Female	32 (43.2)	39 (71.2)	
<b>Education</b>			
Illiterate	14 (18.9)	19 (26.0)	.487
Primary	39 (52.7)	40 (54.8)	
High school	14 (18.9)	7 (9.6)	
University	7 (9.5)	7 (9.6)	
<b>Marital Status</b>			
Married	62 (83.8)	63 (86.3)	.213
Single	12 (16.2)	10 (13.7)	
<b>Level of Income</b>			
Good	17 (23.0)	7 (9.6)	.858
Moderate	46 (62.2)	57 (78.1)	
Bad	11 (14.9)	9 (12.3)	
<b>Job</b>			
Housewife	32 (43.2)	30 (41.7)	.748
Official	12 (16.2)	19 (26.4)	
Worker	16 (21.6)	17 (23.6)	
Independent Business	14 (18.9)	6 (8.3)	

Chi-square tests were used for the statistical analysis, except for age, in which case *t*-tests were used ( $p > 0.05$ ).

Evaluating the statements of the patients concerning where they got the information about the nutrition, it was determined that 59.5 % of the experimental group and 49.3 % of the control group got the most information from the doctors and nurses mostly.

When examining the BKI averages of the experimental group; it was detected that the BKI averages were  $26.17 \pm 5.34$  at the start of the treatment, they were  $25.67 \pm 5.73$  1 month after the treatment and the education and finally they were  $25.56 \pm 6.19$  3 months after the treatment and the education. When examining the BKI averages of the control group, it was detected that the BKI averages were  $25.56 \pm 4.95$  at the start of the treatment, they were  $24.70 \pm 5.65$  1 month after the treatment and the education and finally they were  $23.33 \pm 6.78$  3 months after the treatment and the education.

When examining the averages of the circle of the abdomen in the experimental group, it was detected that the averages were  $90.95 \pm 13.77$  at the onset of the treatment. They were  $89.51 \pm 14.14$  1 month after the education that was given right after the treatment and they were  $89.50 \pm 14.81$  after the education. When examining the averages of the circle of the abdomen in the control group, it was detected that the averages were  $89.26 \pm 12.95$  at the start of the treatment, they were  $87.38 \pm 14.54$  in 1 month after the education and they were  $84.97 \pm 15.57$  in 3 months period after the education. When examining the averages of the circle of the arm in the experimental group, it was detected that the averages were  $27.51 \pm 3.70$  at the start of the treatment, they were  $26.98 \pm 4.06$  in 1 month period after the education and they were  $26.94 \pm 4.93$  in 3 months period after the education. When examining the averages of the circle of the arm in the control group, it was detected that the averages were  $26.31 \pm 3.47$  at the start of the treatment, they were  $25.41 \pm 4.11$  in 1 month period after the education and they were  $24.32 \pm 4.55$  in 3 months period after the education. According to these findings obtained, no notable difference between the anthropometric measurements of the experimental group before the education and after the education was detected. However, when comparing the anthropometric measurements of the control group, it was detected that there was a statistically notable difference between the measurements performed 1 month and 3 months after the RT, which means the anthropometric values decrease as time passes. Anthropometric measurements are shown in Table 2.

**Table 2.** The comparison of the antropometric measurements of the groups before and after the educations

<b>Anthropometric Measurements</b>	<b>Before education</b>	<b>One month after education</b>	<b>Three months after education</b>	<b>p</b>
<b>BMI</b>				
Experimental	26.17±5.34	25.67±5.73	25.56±6.19	.163
Control	25.56±4.95	24.70±5.65	23.33±6.78	<.001
<b>Waist circumference</b>				
Experimental	90.95±13.77	89.51±14.14	89.50±14.81	.079
Control	89.26±12.95	87.38±14.54	84.97±15.57	<.001
<b>Arm circumference</b>				
Experimental	27.51±3.70	26.98±4.06	26.94±4.93	.097
Control	26.31±3.47	25.41±4.11	24.32±4.55	<.001

One-way analysis of variance was used for the statistical analysis.

Note. BMI: Body mass index

When checking the changes in weight of the patients in the experimental and control group, after the first assessment, it was detected that 23.3 % of the patients in the experimental group had an increase and 27.4 % of them had a decrease and 49.3 % of the patients had a stability in their weight, whereas 16.4 % of the patients in the control group had an increase, 28.8 % of them had a decrease and 54.8 % of the patients had a stability in their weight.

When checking the weight observations 1 month after the education given the patients in the experimental group, it was detected that 23 % of them had an increase in their weight, 40.5 % of them had a decrease and 36.5 % of them had a stability, whereas for the patients in the control group, 23.3 % had an increase in their weight, 43.8 % of them had a decrease and 32.9 % had a stability in their weight.

3 months after the education, it was detected that 36.5 % of the patients in the experimental group had an increase in their weight, 33.8 % had a decrease and 29.7 % had a stability in their weight, whereas for the patients in the control group, 15.1 % had an increase in their weight, 49.3 % had a decrease and 35.6 % of the patients had a stability. According to the statistical analysis, there was a notable difference between the groups 1 month after the education. However, when repeating the statistical analysis, there seemed no significant difference between the groups 3 months after the education. When considering the numerical

assessment, it was detected that the number of the patients in the experimental group who had a weight loss decreased while the number of the patients in the control group who had a weight loss increased ( $p>0.05$ ). The weight losses of the patients are shown in Table 3.

**Table 3.** The comparison of the weight losses of the patients in the experimental and control group before and after the education

	Increase	Before Education Decrease	Stable	<i>p</i>
<b>Experimental group n(%)</b>	17 (23.3)	20 (27.4)	36 (49.3)	.442
<b>Control group n(%)</b>	12 (16.4)	21 (28.8)	40 (54.8)	
<b>One month after education</b>				
<b>Experimental group n(%)</b>	17(23.0)	30 (40.5)	27 (36.5)	.043
<b>Control group n(%)</b>	17 (23.3)	32 (43.8)	24 (32.9)	
<b>Three months after education</b>				
<b>Experimental group n(%)</b>	27 (36.5)	25 (33.8)	22 (29.7)	.864
<b>Control group n(%)</b>	11 (15.1)	36 (49.3)	26 (35.6)	

Chi-square tests were used for the statistical analyses.  $p>0.05$  before and 3 months after education;  $p<0.05$  1 month after education.

As a result of the assessments conducted according to the scale of Subjective Global Assessment, the patients who are thought not to have malnutrition are described as A, the patients who are thought to have mild malnutrition are described as B and the patients who are thought to have severe malnutrition are described as C. When applying SGA to the patients in the experimental and control groups who were decided to receive radiotherapy, it was detected that 2.7 % of the patients in both groups had mild malnutrition. As a result of the SGA, B (mild/medium malnutrition) was detected. As a result of the statistically assessment performed, there seemed no significant difference between the groups ( $p>0.05$ ).

Dietetics was given all the patients in the experimental group and after the education, it was detected that 6.6 % of these patients had mild and 1.3 % had severe malnutrition, whereas for



the patients in the control group who had no dietetics, 11 % had had mild and 4.1 % had severe malnutrition ( $p < 0.05$ ). The malnutrition conditions of the patients 1 months after the dietetics are shown in Table 4. As a result of the statistically assessment performed, a significant difference between the groups was detected. According to the data of the scale performed 1 month after the treatment, it was observed that the rate of the emergence of the malnutrition in the patients of the experimental group who had dietetics decreased ( $p = 0.001$ ).

**Table 4.** The comparison of the malnutrition conditions of the patients in the experimental and control groups 1 month after the dietetics.

SGA results 1 month after dietetics				
	A	B	C	<i>p</i>
<b>Experimental group <i>n</i> (%)</b>	68 (91.9)	5 (6.6)	1 (1.3)	0.001
<b>Control group <i>n</i> (%)</b>	62 (84.9)	8 (11.0)	3 (4.1)	

Chi-square tests were used for the statistical analyses ( $p < 0.05$ ).

**Table 5.** The comparison of the malnutrition conditions of the patients in the experimental and control groups 3 months after the dietetics.

SGA results 3 months after dietetics				
	A	B	C	<i>p</i>
<b>Experimental group <i>n</i> (%)</b>	85.1 (63.0)	9.5 (7.0)	5.4 (4.0)	0.046
<b>Control group <i>n</i> (%)</b>	65.8 (48.0)	21.9 (16.0)	12.3 (9.0)	

Chi-square tests were used for the statistical analyses ( $p < 0.05$ ).

When making a new assessment to the patients after the education, it was detected that 9.5 % of the patients in the experimental group had mild malnutrition and 5.4 % had severe malnutrition. When examining the same condition for the control group, it was discovered that 21.9 % of them had mild malnutrition and 12.3 % of them had severe malnutrition. As for the statistical assessment of the patients 3 months after they started radiotherapy, there seemed no significant difference between the groups ( $p > 0.05$ ). The malnutrition conditions of the patients 3 months after the dietetics are shown in Table 5. The results obtained cause us to

thing that dietetics given the patients has an influence on the decrease of the malnutrition. But, this influence decreases after a while if the dietetics is not constant.

## Discussion

According to the report of the World Health Organization, it is estimated that the increase in cancer diseases in the developing countries will be over 70 % by 2020. It is of great significance that nutritional disorders which is an important problem for the cancer patients, be diagnosed very early, that necessary nutritional support be started and that the influence of the radiotherapy and chemotherapy be increased [12].

Anthropometry is one of the measurement methods to determine the malnutrition. On the other hand, in the anthropometric measurements, BKI is one of the parameters used as a determinant. The nutritional condition of the individual affects the health condition, well-being, performance and the resistance against the diseases of the individual. When examining the BKI averages of the patients in the experimental group, it was detected that they were  $26.17 \pm 5.34$  at the start of the treatment, and then these averages fell to  $25.67 \pm 5.73$  1 month after the treatment and the education and then fell to  $25.56 \pm 6.19$  3 months after the treatment and the education. These findings indicated that malnutrition started. When examining the BKI averages of the patients in the control group, it was detected that they were  $25.56 \pm 4.95$  at the start of the treatment, and then these averages fell to  $24.70 \pm 5.65$  1 month after the treatment and the education and then fell to  $23.33 \pm 6.78$  3 months after the treatment and the education. According to these findings, as from the end of the first month, the number of the patients who had a decrease in the BKI in the experimental group was less compared with the ones in the control group. In the study Iren carried out, when comparing the change in BKI who received nutritional support at the start and at the end of the treatment, no meaningful difference was detected; however, in the group who did not have a nutritional support, it was detected that BKI fall was faster [13,14,15]. It can be seen that the results of our study are similar to the results of this study.

Other anthropometric measurements in the study used to assess the malnutrition are the size of the abdomen and the thickness of the arm. When examining the abdomen averages of the patients in the experimental group at the start of the treatment, it was detected that these averages were  $90.95 \pm 13.77$  and 1 month after the education they fell to  $89.51 \pm 14.14$  and 3

months after the education they fell to  $89.50 \pm 14.81$ . When examining the abdomen averages of the patients in the control group at the start of the treatment, it was detected that these averages were  $89.26 \pm 12.95$  and 1 month after the education they fell to  $87.38 \pm 14.54$  and 3 months after the education they fell to  $84.97 \pm 15.57$ . It was discovered that these averages in both groups were higher than 62-82 cm which the World Health Organization established as the lowest abdomen circle; however, according to the results, the decrease in the average of the abdomen circle in the patients of the experimental group was less compared with the average of the control group.

When examining the averages of the arm circle of the patients in the experimental group at the start of the treatment, it was detected that these averages were  $27.51 \pm 3.70$  and 1 month after the education they fell to  $26.98 \pm 4.06$  and 3 months after the education they fell  $26.94 \pm 4.93$ . When examining the averages of the arm circle of the patients in the control group at the start of the treatment, it was detected that these averages were  $26.31 \pm 3.47$  and 1 month after the education they fell to  $25.41 \pm 4.11$  and 3 months after the education they fell  $24.32 \pm 4.55$ . It was detected that the averages of the arm circles of both groups was between 19-28 cm which was accepted as the lowest value according to the measurements of the WHO. According to the results obtained from the measurements of the abdomen and arm circles of the patients, it was detected that the averages of the experimental group were higher compared with the averages of the control group.

Nayel and his friends randomly divided 33 patients with head-neck cancer receiving RT into two groups as the group receiving nutritional support and control group and examined their weight loss and the adverse effects of the treatment [16]. Before the treatment and during the radiotherapy every week, the patients were assessed by using anthropometric measurements such as body weight and upper arm skin-curve thickness. No weight loss was observed in the group receiving nutritional support, whereas 58 % of the patients in the control group had weight loss ( $p=0.001$ ). Comparing the results of the study Nayel and his friends conducted with the results of this study, there seems a difference between them. In the study Nayel and his friends conducted, the patients in the experimental group had no weight loss; however, according to the results of this study, the patients in the experimental group had weight loss, but compared with the patients in the control group the number of the patients losing weight is lower.

Evaluating whether the patients in both groups had a change in their weight in order to see the effect of the nutritional support given in the study on the weight loss, it was detected that 27.4 % of the patients in the experimental group had a decrease in their weight according to the measurements at the start of the treatment, 40.5 % of the patients had a weight loss 1 month after the treatment and 33.8 % had a weight loss in the measurements performed 3 months after the treatment. According to the evaluation results of the control group, it was detected that 28.8 % of the patients in the experimental group had a decrease in their weight according to the measurements at the start of the treatment, 43.8 % of the patients had a weight loss 1 month after the treatment and 49.3 % had a weight loss in the measurements performed 3 months after the treatment. According to the statistical analysis performed, it was discovered that there was a significant difference between the groups 1 month after the education and the number of the patients in the experimental group having weight loss was less. When making an assessment again 3 months later, no statistical difference between the groups was observed. However, it was detected that the number of the patients in the experimental group was less compared with the control group.

Proper nutrition is of great significance in terms of the success of the treatment of the cancer and decreasing the risk of complications especially arising from the disease itself; on the other hand, there are some difficulties during the treatment concerning the proper nutrition due to the adverse effects [17].

When checking the ranking of the malnutrition before the education by SGA in both groups in the study, it was detected that 2.7 % of the patients had mild malnutrition. According to the statistical assessment results, no significant difference between the groups was observed. In a study Sungurtekin and his friends conducted, the methods of SGA and NRI were compared. In the study on the 251 patients lying at the hospital, according to SGA method, it was detected that 30 % of the patients had malnutrition [18]. This rate was 27 % in the study Oguz and his friends conducted, and 29.8 % in the study Yaris and his friends conducted and it was seen that this rate was rose to 38.3 % during the treatment [19-21].

It is largely accepted by the clinicians that severe malnutrition accompanies the malignity in the 30 % of the patients and as a result leads to severe losses, that it accounts for 30 % of the deaths resulting from the cancer, that it is responsible for 30-50 % of the deaths resulting from GIS cancer and 80 % of the deaths resulting from advanced stage pancreas cancer. In the

study Borazan and his friends conducted, it was detected that 50.7 % of the patients ranked in terms of malnutrition through SGA had a severe malnutrition [22,23]. It is thought that the reason why the number of the patients with malnutrition in this study was less compared with other studies was that the patients accepted to the study were chosen from the patients with no malnutrition.

In the study, all the patients in the experimental group were given dietetics and when reassessing the patients in terms of the malnutrition 1 month after the education, it was detected that there was a difference between the groups statistically and the education had an effective role in the malnutrition. However, when making a statistical assessment according to the data obtained 3 months after the education, it was discovered that there was no meaningful difference between the groups. This result determined 3 months after the treatment indicates that the effect of the dietetics decreases if the dietetics does not have continuity. For that reason, it is suggested that the patients receiving radiotherapy be given dietetics regularly by the nurses in order to decrease the malnutrition.

### Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this article.

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