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The effects of nutrition education with Pecha Kucha method on prevention of malnutrition in cancer patients undergoing radiotherapy: a randomised controlled study

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Abstract

Aim The present study aimed to evaluate the effects of nutrition education by using the Pecha Kucha (20*20) presentation method on preventing malnutrition in cancer patients undergoing radiotherapy.

Method This randomized controlled experimental study. A total of 113 patients were assessed for eligibility. Thirty-three patients declined to participate, and 20 did not meet the inclusion criteria. The final sample consisted of 60 volunteering cancer patients who met the inclusion criteria and agreed to participate. These patients were randomly assigned to either the experimental group ($n=30$) or the control group ($n=30$). All participants completed the study. The experimental group received nutrition education by using the Pecha Kucha method, while the control group received traditional education. Data were collected by using Personal Information Form, NRS-2002 (Nutritional Risk Screening) Assessment Form and Subjective Global Assessment (SGA).

Results The first and third month NRS-2002 scores of the experimental group were significantly lower than the control group(better nutritional status) ($p<0.001$). After three months, the number of well-nourished individuals decreased in both groups; however, this decline was more pronounced in the control group ($p=0.001$). In contrast, the intervention group largely maintained their nutritional status. NRS-2002 ($\beta=-0.683$, $p<0.001$) and SGA ($\beta=-3.324$, $p<0.001$) values were lower in the group that received pecha kucha application.

Conclusion The negative beta coefficient for NRS-2002 suggests that the Pecha Kucha training significantly reduced patients' nutritional risk. Similarly, the reduction in SGA scores reflects improved nutritional status, indicating a meaningful clinical improvement. Nutrition education provided by Pecha Kucha method is effective in preventing malnutrition in cancer patients undergoing radiotherapy. This educational method is considered to be an effective approach with high applicability in clinical settings. It is recommended that innovative and audiovisual presentation techniques such as Pecha Kucha should be utilized to strengthen responsibilities of nurses in patient education and to increase the effectiveness of education processes.

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Trial registration The study has been registered on ClinicalTrials.gov Protocol Registration (https://register.clinicaltrials.gov/prs/app/action/ViewOrUnrelease?uid=U0004RLH&ts=1&sid=S000D85L&cx=bmoiql) on 5 January 2023 (Trial Registration Number: NCT05852756).

Keywords Nursing, Cancer, Malnutrition, Pecha Kucha, Radiotherapy

Introduction

Cancer is defined as a large group of progressive diseases characterised by abnormal and uncontrolled disproportionate growth and proliferation of cells formed in different parts of the body and tumours that appear [1, 2]. The incidence and mortality of cancer are rapidly increasing worldwide. According to GLOBOCAN 2022 data, approximately 20 million new cancer cases and 9.7 million cancer-related deaths occurred globally [3]. Due to an aging population and changes in lifestyle factors, the number of new cancer cases is expected to reach approximately 35 million annually by 2050 [4]. In Turkey, about 240,000 new cancer cases were diagnosed in 2022, and approximately 129,672 people died from cancer-related causes [5].Cancer treatment varies depending on the stage of the disease, the patient's overall health status, and other factors. Treatment methods include chemotherapy, radiotherapy, stem cell therapy, gene therapy, hormonal treatments, surgical interventions, and growth inhibitors. Each method has its own advantages and disadvantages; therefore, the treatment plan is determined individually for each patient [6].

Radiotherapy, which is a treatment method based on killing cells by ionising radiation to treat cancer, is the leading traditional cancer treatment method today. Radiotherapy can be applied to a specific area or to the whole body as external or internal radiotherapy. The aim of radiotherapy methods is to destroy cancer cells as much as possible and to damage healthy cells as little as possible [7]. Changes in taste and smell are common in patients undergoing radiotherapy. These changes in perception may be related to mucositis caused by direct injury to the papillary mucosa, or may develop due to concurrent chemotherapy, secondary candidiasis infection, deficiencies of water-soluble vitamins (B2, B3, folates, B12, etc.) and poor oral hygiene, especially in head, neck and oesophageal cancers [8]. Loss of appetite, early satiety, malabsorption, loss of taste, nausea, vomiting, diarrhoea and depression caused by these treatment methods lead to deficiency in nutrient intake. Disruption of this balance causes malnutrition, which is an important source of morbidity and mortality in cancer patients [9]. Malnutrition is defined as undernourishment due to inadequate nutrient intake, specific nutrient deficiencies and imbalance due to imbalanced nutrient intake [10]. Adequate and balanced nutrition during cancer treatment enables individuals to cope with side effects more easily, strengthens the immune system, protects healthy cells, prevents weight loss and increases compliance with treatment [11]. Nutritional management in cancer patients should be performed by a team established with interdisciplinary co-operation. This team should include oncologists, nurses, dieticians and psychologists [12]. Nutritional education provided by nurses with special techniques and the behavioural changes that develop accordingly form an important part of treatment and care [13, 14].

Pecha-Kucha is a new and innovative presentation style and a method used in trainings globally [15, 16]. It refers to a presentation method developed to attract and maintain the audience's interest over a series of different presentations [16]. Pecha Kucha, derived from the Japanese word for 'conversation', helps to present creative work in visual images [13, 15, 17]. Pecha Kucha is a practical presentation method consisting of 20 slides, each of which is shown for 20 s, for a total of 6 min and 40 s, in which information is structured in a simple and natural way [16]. Pecha Kucha is an innovative and visually oriented presentation technique used globally in educational settings. Compared to traditional instructional methods, it offers several advantages by delivering dense information in a short time through engaging visuals, fostering greater interaction and retention [15, 18, 19]. In patient education—where information overload is common and attention spans are often limited—effective and memorable communication is essential. The structured, time-constrained, and image-based format of Pecha Kucha helps reduce cognitive load and supports better understanding [18, 20]. Particularly for cancer patients undergoing radiotherapy, who often experience physical and emotional exhaustion, visually simplified and concise educational content can enhance accessibility and recall of health information [21]. In this context, Pecha Kucha presents itself as a time-efficient, patient-centered method suitable for healthcare education.

While no study to date has directly evaluated the effectiveness of Pecha Kucha in providing nutritional education to prevent malnutrition in cancer patients undergoing radiotherapy, the method has been employed in similar health education contexts [16, 19, 22–26]. However, none of these studies applied the method to direct patient education aimed at behavioral outcomes such as nutritional management. Therefore, the current study fills a unique gap by applying an innovative presentation strategy to a clinically significant issue—malnutrition in oncology—within a patient education context. It

offers original contributions by integrating educational technique, clinical need, and patient vulnerability into a unified intervention model.

Research Hypotheses

H0: Nutrition education given by pecha kucha method to cancer patients undergoing radiotherapy has no effect on preventing malnutrition.

H1: Nutrition education given by pecha kucha method to cancer patients undergoing radiotherapy has effects on preventing malnutrition.

Material and method

Desing

This study was conducted as a pretest–posttest randomised control group study to examine the effects of nutrition education given by pecha kucha method on preventing malnutrition in cancer patients undergoing radiotherapy.

Population and sample selection

Study population consisted of cancer patients in the Radiation Oncology Unit of Elazığ Fethi Sekin City Hospital between March and July 2023. Patients diagnosed with all types of cancer were included in the study. No restrictions were imposed in terms of cancer type. Sample size was determined by performing a priori power analysis with G-Power 3.1.9.4 programme. Since there were no similar studies in the literature, considering the effect size of 0.8 according to the independent groups t test in Cohen's effect size Table [27], confidence interval of 95% [28], significance level of 0.05 [28] and power of 0.80 [29], it was determined that the minimum number of patients to be included in the study was 42, 21 for the experimental group and 21 for the control group. It should be noted, however, that an effect size of 0.8 corresponds to a large effect and may be optimistic for a behavioral intervention in a clinical setting. This assumption was made due to the lack of prior empirical data.

A total of 113 patients were contacted during the study period. Thirty-three refused to participate, and 20 were excluded for not meeting the study criteria. Ultimately, the study was conducted with 60 volunteer cancer patients who met the criteria: inclusion criteria included being 18 years of age or older, receiving radiotherapy for the first time, and having the cognitive ability to understand and answer the questions. Exclusion criteria included patients diagnosed with cachexia (those who were clinically evaluated by relevant physicians and diagnosed with cachexia before inclusion in the study, such as those with a body mass index < 18.5 or those who had unintentional weight loss of more than 5% in the last 6 months), as well as those with communication problems related to hearing, language, or comprehension.In the study, randomisation was performed in the Numbers sub-heading of the random.org website (https://www.random.org/#numbers) without considering the chara cteristics of the patients such as age and marital status. By using the Random Integer Generator method in the system, a single grouped column between 1- 60 was created in the system. The numbers 1 and 2 were observed in the created column. At the beginning of the study, an independent researcher determined which number was the intervention and which number was the control by drawing lots. As a result of the draw, it was determined that the odd number (1) was intervention and the even number (2) was control.This process ensured allocation concealment and minimized selection bias.The study adhered to the Consolidated Standards of Reporting Trials (CONSORT) Checklist and Flow Diagram guidelines (see Fig. 1 CONSORT Diagram). Additionally, the study was registered in ClinicalTrials.gov (registration number: NCT05852756) When the research was completed, the data were analysed by a statistician independent of the research who did not know groups 1 and 2, and blinded data analysis was performed.

Data collection tools

Data were collected by the researcher using Personal Information Form, NRS-2002 (Nutritional Risk Screening) Assessment Form and Subjective Global Assessment (SGA).

Personal information form

The patients' descriptive characteristics consisted of a total of 20 questions about age, gender, marital status, educational status, occupation, presence of comorbidities, date of hospitalization, and date of radiotherapy initiation.

Nutritional risk screening assessment form

It was developed by Kondrup et al. in 2003 [30]. Turkish validity and reliability of the scale was conducted by Başak Bolayır (2014) [31]. The Nutritional Risk Screening 2002 (NRS-2002) form was developed to assess the risk of malnutrition in hospitalized adult patients, particularly those with acute or chronic illnesses. It is a standardized tool recommended by the European Society for Clinical Nutrition and Metabolism (ESPEN) for use in clinical settings. In this scale, individuals are first given a preliminary screening test. The scoring system consists of two parts: 'nutritional status' and 'severity of illness' and allows scoring as 'no problem', 'mild', 'moderate' and 'severe'. Each section is scored between 0 and 3. In patients over 70 years of age, 1 point is added to the score due to age. Patients with a total score of ≥ 3 are considered to be at nutritional risk.

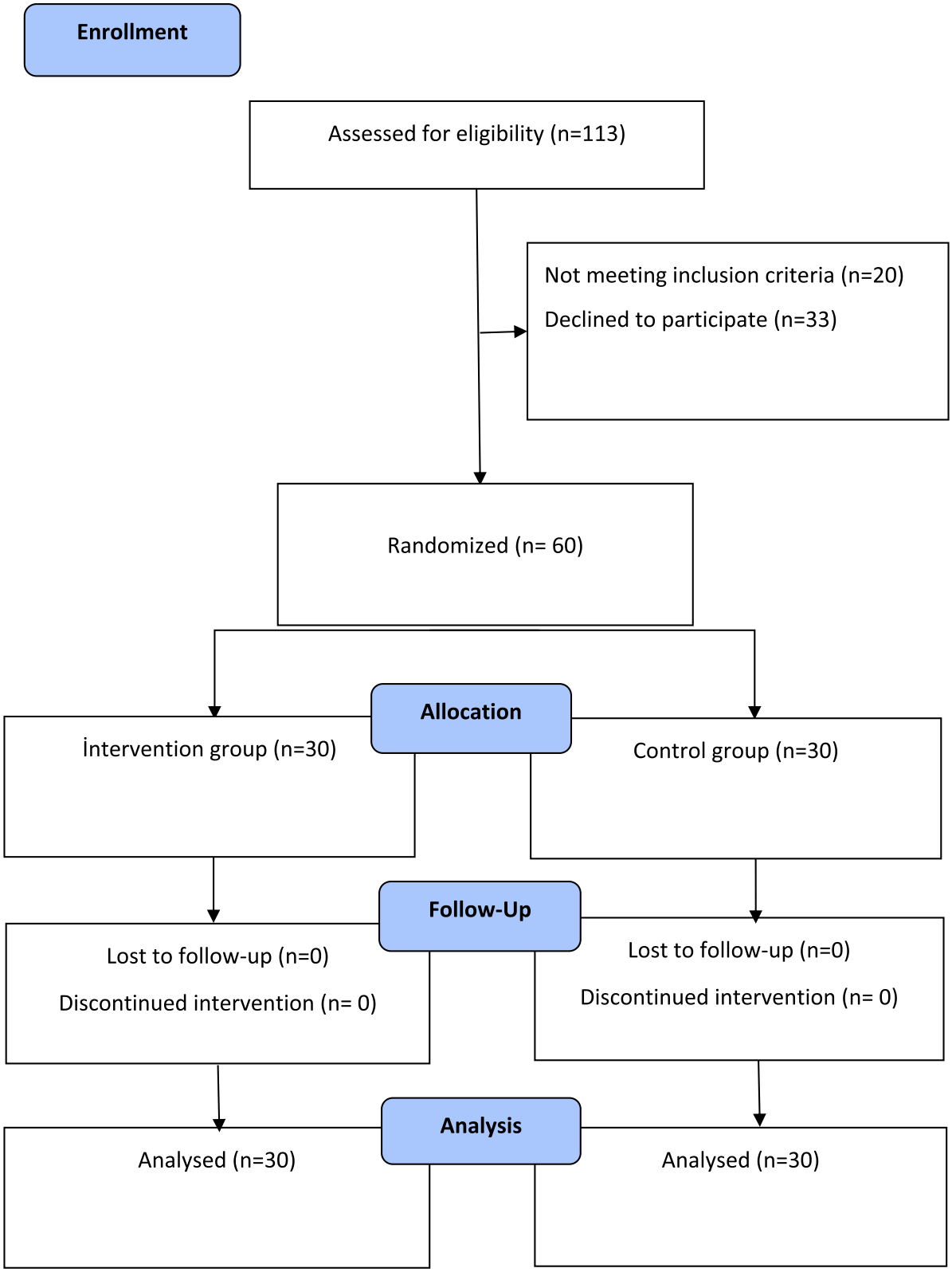

Fig. 1 Consort Diagram

In our study, the NRS-2002 was used to assess nutritional risk among cancer patients receiving radiotherapy. The Turkish version of the form has already been adapted and validated in previous studies. Therefore, no new reliability analysis was conducted within the scope of this study; the previously validated Turkish version was used as the basis.

Subjective global assessment

Subjective Global Assessment scale is a clinical technique based on anamnesis and physical examination characteristics. In the 1987 study by Detsky et al., this index was noted for its simplicity and predictive efficacy as well as its objective criteria [32]. Medical history includes weight change, changes in eating status, gastrointestinal symptoms lasting longer than two weeks, and changes in functional capacity. The major components of SGA are weight loss in the last 6 months and weight loss in the last 2 weeks. In physical examination, loss of subcutaneous adipose tissue, muscle loss, presence of ankle/scrotal edema and ascites are questioned. It is very important to consider the primary disease and disease-related nutrient requirements. After recording SGA-related parameters, the patient is categorized into three categories: 'well-nourished' (A), 'moderate or suspected malnutrition' (B) and 'severely malnourished' (C).

Implementation

The Pecha Kucha presentation was prepared by the researcher, adhering to the established literature and the specific requirements of the technique [16]. The educational program includes information designed to prevent radiotherapy-induced malnutrition. To ensure the content validity of the final version of the Pecha Kucha nutrition presentation, five experts (two academic nurses specialized in internal medicine nursing,, one dietician, and two oncology nurses) were consulted. The Content Validity Index (CVI) was calculated to assess the relevance and clarity of the presentation content. Each expert rated the items using a 4-point Likert scale (1 = not relevant, 4 = highly relevant). The Item-Level Content Validity Index (I-CVI) ranged from 0.80 to 1.00, and the Scale-Level Content Validity Index (S-CVI) was calculated as 0.96, indicating excellent content validity. Following the expert evaluation, a face validity assessment was carried out through a pilot study involving five cancer patients who met the inclusion criteria. These patients were asked to provide feedback on the clarity, understandability, logical flow, and visual structure of the presentation. Their responses were collected through open-ended questions and a short evaluation form. Based on their feedback, minor adjustments—such as simplifying specific terminology and modifying slide order—were made. This process ensured that the educational content appeared clear, appropriate, and user-friendly to the target audience.

Patients who participated in the face validity assessment were not included in the main study. The finalized "Pecha Kucha Information" education was then administered to the experimental group.The presentations were conducted in a separate room with face-to-face seating arrangement, using the researcher's computer positioned centrally between the participant and the researcher. Before the presentation, participants were informed about the duration of the session and given the opportunity to ask questions after watching the content. Then, a 6 min and 20 s Pecha Kucha presentation was made on the computerr. The presentation was automated to adhere to the 20 s per slide format, with each slide progressing at a fixed interval. This eliminated variability in timing and ensured compliance with the Pecha Kucha format. In addition, all presentations were conducted by the same researcher to ensure consistency in delivery style, tone, and participant engagement. Standardizing the intervention delivery in this way is a key strategy to enhance intervention fidelity and minimize variability between sessions [33].

The educational intervention was administered in a single, structured individual session for each participant. Each session took place in a quiet, private room within the clinic and consisted of a 6-min and 20-s presentation, followed by a 5–10-min semi-structured Q&A and feedback period. No repeated or follow-up sessions were conducted.

To assess the impact of the intervention, data collection tools (NRS-2002, and SGA) were administered to both the experimental and control groups at three time points: baseline (pre-intervention), one month post-intervention, and three months post-intervention. All sessions and assessments were conducted under standardized physical and procedural conditions by the same researcher to ensure consistency, reduce bias, and maintain data integrity.

Participants in the control group received a single session of traditional nutrition education delivered by the same researcher and were provided with brochures published by the Ministry of Health containing the same content as the experimental group. They were given adequate time to review the materials and ask questions. Following this, data collection was carried out using the same instruments and under similar conditions as in the experimental group to ensure consistency and minimize potential bias between groups.

Data assessment

The data obtained in this study were analysed using SPSS (Statistical Package for Social Sciences) 25.0 software. Frequency, percentage, mean and standard deviation

values were calculated as descriptive statistics. In the comparison of the demographic characteristics of the experimental and control groups, Chi-square test was used for categorical variables. For continuous variables, the distribution characteristics of the data were analysed in order to evaluate the usability of parametric tests. In this context, skewness and kurtosis coefficients of each variable were analysed. The fact that the skewness and kurtosis coefficients were outside the range of ± 1.5 revealed that the relevant variables did not show a normal distribution, and since the assumption of normal distribution was not met in the data set, nonparametric tests were preferred. Mann Whitney-U test, which is a nonparametric test for independent samples, was used to compare the scale scores between the experimental and control groups. This test gives reliable results especially in cases where the sample size is limited and the distribution is not normal. Friedman's test, which is also a nonparametric multivariate test, was used to analyse the change in the differences between the groups according to time. This test is a suitable method for comparing measurements of the same group at different times.

Ethical principles

Before initiating the study, permission was obtained from the Non-Interventional Ethics Committee of Fırat University (Dated 23.02.2023, numbered 2023/03–23) and the institution where the study would be conducted. Before starting to collect the research data, the participants were informed about the research and the "Informed Consent Principle" was fulfilled by obtaining their consent. Care was taken to comply with the "Autonomy Principle" by stating that the participants could withdraw from the research at any time, and the "Confidentiality and Protection of Privacy Principle" by stating that individual information would be protected after it was shared with the researcher. By stating that the information obtained and the identity of the respondent would be kept confidential, the "principle of anonymity and security" was fulfilled. The principles of the Helsinki Declaration of Human Rights have been complied with.

Results

Table 1 shows the results of the comparison of sociodemographic and disease characteristics of experimental and control group patients. No statistically significant difference was found between the groups in terms of sociodemographic and disease related characteristics ($p > 0.05$).

The mean NRS-2002 scores were compared between the experimental and control groups and the differences between the initial and subsequent scores were calculated for each group. There was no statistically significant difference between the mean NRS-2002 scores before the education in the comparison between the groups ($p > 0.05$). However, the first and third month NRS-2002 scores of the experimental group were significantly lower than the control group ($p < 0.01$). In intragroup comparison, a statistically significant difference was found between the pre-education, first and third month NRS-2002 scores in the experimental and control groups ($p = 0.001$) (Table 2).

No statistically significant relationship was found between the pre-education SGA value and the groups ($p > 0.05$). A statistically significant relationship was found between the SGA value and the groups 1 month after the education ($p = 0.001$; $p < 0.05$). In the well-nourished group, the higher rate of those in the experimental group compared to those who were not in the experimental group was found to be statistically significant ($p = 0.001$; $p < 0.01$). In the severe malnutrition group, the rate of those in the experimental group was lower than those in the non-experimental group, which was statistically significant ($p = 0.001$; $p < 0.01$). A statistically significant relationship was found between the SGA value 3 months after the education and the groups ($p = 0.001$; $p < 0.05$). In the well-nourished group, the rate of those who were in the experimental group was higher than those who were not, which was statistically significant ($p = 0.001$; $p < 0.01$) (Table 3).

In the experimental group; SGA values by periods were found to be statistically significant ($p = 0.001$; $p < 0.01$). The proportion of the well-nourished group 3 months after the training was found to be higher than before the training ($p = 0.001$; $p < 0.01$). The proportion of the severely malnourished group 3 months after the training was found to be lower than before the training ($p = 0.001$; $p < 0.01$) (Table 3). Indicating improved nutritional status in the experimental group.

In the control group; SGA values were found to be statistically significant in terms of periods ($p = 0.001$; $p < 0.01$). The higher rate of the well-nourished group before the education compared to 3 months after the education was found to be statistically significant ($p = 0.001$; $p < 0.01$). The higher rate of severe malnutrition group before the education compared to 3 months after the education was found to be statistically significant ($p = 0.001$; $p < 0.01$) (Table 3).

A simple linear regression analysis was conducted to examine the effect of the Pecha Kucha training on NRS-2002 scores. The model was statistically significant ($F(1,58) = 50.697$, $p < 0.001$), and the Pecha Kucha variable accounted for 46.6% of the total variance in NRS-2002 scores ($R^2 = 0.466$, $p < 0.001$). The regression coefficient indicated a significant negative relationship ($\beta = -0.683$, $p < 0.001$), suggesting that the Pecha Kucha training led to a reduction in NRS-2002 scores. This decrease reflects a clinically meaningful improvement in nutritional risk,

Table 1 Comparison of descriptive characteristics of intervention and control group patients ($n=60$)

		Experimental Group (n = 30)	Control Group (n = 30)		
		Mean ± Sd	**Mean ± Sd**	**z**	**p[a]**
Age (Years)		54.37 ± 10.39	57.77 ± 9.51	−0.932	0.351
Body Mass Index		21.33 ± 4.21	20.84 ± 3.4	−0.133	0.894
Weight Lost During Chemotherapy		3.13 ± 5.63	2.8 ± 4.16	−0.155	0.877
Duration of Radiotherapy (months)		12 ± 8.3	12.73 ± 7.71	−0.637	0.524
		n (%)	n (%)	X^{2*}	p^{**}
Gender	Female	14 (48.3%)	15 (51.7%)	0.067	0.796
	Male	16 (51.6%)	15 (48.4%)		
Diagnosis	Breast Cancer	11 (64.7%)	6 (35.3%)	6.838	0.554
	Prostate Cancer	5 (50%)	5 (50%)		
	Larynx Cancer	2 (50%)	2 (50%)		
	Glial Tumor	4 (57.1%)	3 (42.9%)		
	Stomach Cancer	0 (0%)	2 (100%)		
	Lung Cancer	6 (54.5%)	5 (45.5%)		
	Rectal Cancer	1 (33.3%)	2 (66.7%)		
	Thyroid Cancer	1 (20%)	4 (80%)		
	Pelvic Cancer	0 (0%)	1 (100%)		
Marital status	Married	24 (49%)	25 (51%)	0.111	0.739
	Single	6 (54.5%)	5 (45.5%)		
Number of children	0	4 (44.4%)	5 (55.6%)	3.384	0.641
	1	1 (50%)	1 (50%)		
	2	8 (72.7%)	3 (27.3%)		
	3	6 (37.5%)	10 (62.5%)		
	4	4 (50%)	4 (50%)		
	≥ 5	7 (50%)	7 (50%)		
Educational status	Literate	12 (46.2%)	14 (53.8%)	4.043	0.257
	Primary education	6 (37.5%)	10 (62.5%)		
	High school	5 (55.6%)	4 (44.4%)		
	University and above	7 (77.8%)	2 (22.2%)		
Occupation	Housewife	12a (50%)	12a (50%)	10.202	0.070
	Officer	8a (88.9%)	1b (11.1%)		
	Worker	4a (57.1%)	3a (42.9%)		
	Unemployed	1a (14.3%)	6b (85.7%)		
	Self-employed	0a (0%)	3a (100%)		
	Retired	5a (50%)	5a (50%)		
Presence of another disease	Yes	14 (45.2%)	17 (54.8%)	0.601	0.438
	No	16 (55.2%)	13 (44.8%)		
Type of treatment	Inpatient	19 (52.8%)	17 (47.2%)	0.278	0.598
	Outpatient	11 (45.8%)	13 (54.2%)		
Regular medication intake	Yes	15 (46.9%)	17 (53.1%)	0.268	0.605
	No	15 (53.6%)	13 (46.4%)		
Receiving Chemotherapy	Yes	9 (47.4%)	10 (52.6%)	0.077	0.781
	No	21 (51.2%)	20 (48.8%)		
Number of Chemotherapy Cycles	≤ 3	5 (62.5%)	3 (37.5%)	1.269	0.260
	≥ 4	4 (36. %4)	7 (63.6%)		
Weight Loss during Chemotherapy	Yes	8 (44.4%)	10 (55.6%)	0.317	0.573
	No	22 (52.4%)	20 (47.6%)		
Regular Dieting	Yes	17 (53.1%)	15 (46.9%)	0.268	0.605
	No	13 (46.4%)	15 (53.6%)		
Vitamin Nutritional Supplement	Yes	7 (38.9%)	11 (61.1%)	1.270	0.260
	No	23 (54.8%)	19 (45.2%)		

Table 1 (continued)

		Experimental Group (n = 30)	Control Group (n = 30)		
		Mean ± Sd	**Mean ± Sd**	**z**	**p[a]**
Nutritional Information Tool	Mass Media	5 (55.6%)	4 (44.4%)	2.254	0.689
	Dietitian	5 (50%)	5 (50%)		
	Doctor	16 (50%)	16 (50%)		
	Health Centers	0 (0%)	2 (100%)		
	Environment	4 (57.1%)	3 (42.9%)		
Influence of Knowledge on Behavior	Yes	17 (51.5%)	16 (48.5%)	0.067	0.795
	No	13 (48.1%)	14 (51.9%)		

[a]Mann Whitney U Test

*Chi-Square Test

**$p < 0.05$

Table 2 Intragroup and intergroup comparison of mean nutritional risk screening assessment form scores of patients in experimental and control groups

		Experimental Group (n = 30)	Control Group (n = 30)	Test Statistic		
		Mean ± Sd	**Mean ± Sd**	**z**	***p**	**Cohen**
Nutritional risk screening assessment form	Pre-education	1.47 ± 1.22	1.13 ± 1.25	−0.974	0.330	0.2752833
	Month 1	1.3 ± 0.99	2.03 ± 0.76	−2.908	0.004***	0.8271722
	Month 3	1.17 ± 0.79	2.43 ± 0.57	−5.377	0.001***	1.829163
Test statistic		6.500	40.078			
***p*		0.001***	0.001***			

*: Mann Whitney U Test

**: Friedman Test

***$p < 0.05$

Table 3 Intragroup and Intergroup Comparison of Mean Subjective Global Assessment Scores of Patients in Experimental and Control Groups

			Experimental Group ($n = 30$)	Control Group ($n = 30$)	Total	Test Statistic*	*p*
SGA	Pre-education	Well-nourished	13 (48.1%)	14 (51.9%)	27 (100%)	0.816	0.665
		Moderate malnutrition	7 (43.8%)	9 (56.3%)	16 (100%)		
		Severe malnutrition	10 (58.8%)	7 (41.2%)	17 (100%)		
	Total	*n*(%)	30 (50%)	30 (50%)	60 (100%)		
	1 month after education	Well-nourished	10a (100%)	0b (0%)	10 (100%)	16.500	0.001**
		Moderate malnutrition	19a (47.5%)	21a (52.5%)	40 (100%)		
		Severe malnutrition	1a (10%)	9b (90%)	10 (100%)		
	Total	*n*(%)	30 (50%)	30 (50%)	60 (100%)		
	3 months after education	Well-nourished	11a (100%)	0b (0%)	11 (100%)	25.257	0.001**
		Moderate malnutrition	19a (54.3%)	16a (45.7%)	35 (100%)		
		Severe malnutrition	0a (0%)	14b (100%)	14 (100%)		
	Total	*n*(%)	30 (50%)	30 (50%)	60 (100%)		
	X^2		6.500	40.078			
	Test Statistic*		6.423	33.475			
	***p*		0.001**	0.001**			

SGA Subjective Global Assessment

*Chi-Square Test

** $p < 0.05$

indicating that patients who received the training were less likely to be at risk of malnutrition (Table 4).

Simple logistic regression analysis conducted to determine the effects of pecha kucha on SGA was found to be statistically significant ($X2 = 17.256$, $p < 0.001$). The pecha kucha independent variable in the model explains 37% of the total variance of the SGA dependent variable ($R2 = 0.370$, $p < 0.001$). When the regression coefficients are examined, it is seen that pecha kucha ($\beta = -3.324$, $p < 0.001$) has a negative and significant effect on SGA. A

Table 4 Results of simple linear regression analysis to determine the effect of Pecha Kucha education on nutritional risk screening assessment form

Dependent variable	Model	Variables	B	S.Error	β	*t*	*p*
Nutritional risk screening assessment form	1	Fixed	2.433	0.126		19.344	0.001*
		Pecha Kucha Experimental	−1.267	0.178	−0.683	−7.120	0.001*
	$R=0.683, R^2=0.466$						
	$F_{(1.58)}=50.697,\ p=0.001$*						

Table 5 Results of the simple logistic regression analysis conducted to determine the effect of Pecha Kucha process on subjective global assessment

Dependent variable	Model	Variables	B	S.Error	β	*Wald*	*p*
Subjective global assessment	1	Fixed	−3.367	1.017		10.961	0.001*
		Pecha Kucha Experimental	−3.234	1.081	−25.375	−8.950	0.001*
	$R^2=0.370$						
	$X^2=17.256, p=0.001$*						

*$p<0.05$

negative beta coefficient means a lower (improved) SGA value (Table 5).

Discussion

The aim of the present study was to evaluate the effect of nutrition education by using the Pecha Kucha presentation method on preventing malnutrition in cancer patients undergoing radiotherapy.

When the descriptive characteristics of the experimental and control groups were analysed, it was found that the groups were statistically homogeneous ($p>0.05$, Table 1). Therefore, the results of the study were not affected by sociodemographic and disease-related characteristics that could lead to an increase or decrease in NRS-2002 and SGA level of the patients. On the other hand, no statistically significant difference was found between the mean scores of NRS-2002 and SGA. This also ensures homogeneity of the groups in baseline measurement. This study demonstrated that nutrition education delivered using the Pecha Kucha method significantly improved the nutritional status of cancer patients undergoing radiotherapy. Based on NRS-2002 and SGA assessments, patients in the intervention group showed a marked reduction in malnutrition risk and an increase in the proportion of well-nourished individuals over time. Improving the nutritional status of cancer patients is critically important for both the effectiveness of treatment and the patient's overall quality of life. Cancer and its treatments (such as chemotherapy, radiotherapy, and surgery) often lead to side effects like loss of appetite, nausea, vomiting, and weight loss, all of which can negatively impact nutritional intake. Malnutrition weakens the immune system, increases the risk of infections and complications, leads to muscle loss, and reduces the body's ability to respond effectively to treatment. On the other hand, adequate and balanced nutrition supports immune function, helps preserve muscle mass, improves tolerance to therapy, enhances wound healing, and can shorten hospital stays. Additionally, good nutrition contributes to better physical strength and emotional well-being. Therefore, nutrition plays a critical role in managing cancer patients and should be addressed from the time of diagnosis [34–36]. These findings suggest that a brief, structured, and visually engaging educational intervention can lead to meaningful behavioral change, even within a short follow-up period. The effectiveness observed may be partly attributed to the unique vulnerabilities of the study population. Patients initiating radiotherapy often experience fatigue, cognitive overload, and emotional distress, which can impair their ability to absorb and retain traditional health education. In this context, the Pecha Kucha format—with its concise, time-bound, and image-rich presentation style—appears particularly well suited to reduce cognitive burden and enhance attention and recall. While the use of Pecha Kucha in health education is not entirely novel, its application in the context of nutritional education for oncology patients during radiotherapy represents a unique contribution. Unlike prior studies focusing on discharge education [23], vaccination [24], or skill training [26], this study targeted a clinically significant behavioral outcome with measurable nutritional risk reduction. In this method, limiting the use of text encourages the narrator to focus on the topic and make a concise, effective presentation in accordance with time management. Since visualization is prioritized, the aim is to make the concepts more memorable [37]. Thanks to its features such as using time effectively, simplifying information, and emphasizing visual expression, it improves the professional skills of nurses and increases the effectiveness of information transfer [17]. Patient education is one of the fundamental roles of the nurses and it is of great importance to convey information in a comprehensible and effective manner. The Pecha Kucha method, especially thanks to its structure that supports

visual learning, enables simplification of complex information in education for patients compared to traditional education. Nurses can increase the level of knowledge of patients by using this method in subjects such as chronic disease management, lifestyle changes or pre-discharge information [17]. In a study conducted by Kakasci and Durmaz, it was found that discharge training provided via smartphones with the Pecha Kucha method positively affected the readiness levels and anxiety levels of postpartum mothers for discharge from the hospital [23]. Another study published in 2024 showed that stoma care training provided by the Pecha Kucha method increased the stoma care skills of nursing students and decreased their anxiety levels [26]. In the study of Bakır et al. (2022), it was concluded that the COVID-19 vaccine education program implemented using the Pecha Kucha presentation technique on smartphones could develop positive attitudes in the community and increase vaccination rates [24]. Molu et al. showed that the Pecha Kucha presentation technique educated students about HPV vaccine better than Powerpoint. It was concluded that Pecha Kucha presentations helped students learn more and reduced anxiety and fear [38].

The remarkably large effect sizes observed for NRS-2002 scores (Cohen's d = 0.827 at 1 month and d = 1.829 at 3 months) indicate a substantial and potentially meaningful impact of the Pecha Kucha-based educational intervention. Several contextual factors may account for these pronounced effects. First, baseline assessments and pilot feedback suggested a generally low level of nutritional awareness among participants, which may have amplified the relative effect of the intervention. Second, the NRS-2002 instrument is known to be highly responsive to even moderate changes in nutritional behavior and intake, particularly in at-risk clinical populations. Lastly, the Pecha Kucha format—with its concise, visually oriented, and time-bound structure—may have enhanced information retention and facilitated behavioral translation, even with a single session. Overall, the findings support the integration of innovative, patient-centered educational strategies into oncology care. Pecha Kucha and similar formats may serve as valuable tools for nurses and healthcare providers aiming to improve treatment adherence, manage side effects, and enhance patient outcomes through improved nutrition practices. Further multicenter studies with larger sample sizes and long-term follow-up are warranted to validate and expand upon these results.

Limitations

This study has several limitations that should be considered when interpreting the findings. First, it was conducted in a single center, the Radiation Oncology Unit of City Hospital. Differences in hospital settings, patient characteristics, and implementation practices may limit the generalizability of the results. Multicenter studies are needed to assess the applicability of the findings to broader populations.Second, although data analysis was conducted by an independent statistician blinded to group allocation, neither the participants nor the researcher delivering the intervention were blinded. Due to the nature of the educational intervention and the researcher's direct involvement in its delivery, blinding was not feasible. The lack of blinding may have introduced performance or detection bias, particularly in subjective measures such as the NRS-2002 and the SGA. This potential bias should be taken into account when interpreting the outcomes. Lastly, the effect size used for sample size calculation was based on an assumed large effect (Cohen's d = 0.8) due to the absence of prior studies on similar interventions. While the results demonstrated statistically significant improvements, the large observed effect sizes may also reflect optimism in the planning stage and potential biases arising from the lack of blinding or other uncontrolled confounders. These findings should therefore be interpreted with caution and validated in future research with more rigorous methodological controls.

Conclusion

Nutrition education provided by the Pecha Kucha method helps to prevent malnutrition by improving the nutritional status of cancer patients undergoing radiotherapy. This education model can be used as an effective method in clinical practice. Nurses are recommended to utilize innovative methods such as Pecha Kucha to strengthen their patient education roles and make trainings more effective. Long-term studies with larger samples should be conducted on the topic.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12885-025-14626-7.

Supplementary Material 1.

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Authors' contributions

Author Contributorship GB: Conceptualization, Methodology, Investigation, Writing – original draft, Writing – review & editing. Supervision FG: Conceptualization Investigation, Writing – original draft,Writing ZÖ: Conceptualization Investigation, Writing – original draft,Writing –

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Data availability
Availability of data and materials that support the findings of this study are available on request from the corresponding author.

Declarations

Ethics approval and consent to participate
Before initiating the study, permission was obtained from the Non-Interventional Ethics Committee of Fırat University (Dated 23.03.2023, numbered 2023/03–23) and the institution where the study would be conducted. Before starting to collect the research data, the participants were informed about the research and the "Informed Consent Principle" was fulfilled by obtaining their consent. Care was taken to comply with the "Autonomy Principle" by stating that the participants could withdraw from the research at any time, and the "Confidentiality and Protection of Privacy Principle" by stating that individual information would be protected after it was shared with the researcher. By stating that the information obtained and the identity of the respondent would be kept confidential, the "principle of anonymity and security" was fulfilled. The principles of the Helsinki Declaration of Human Rights have been complied with.

Consent for publication
Not applicable. This manuscript does not include identifying images or personal or clinical details of participants that compromise anonymity.

Competing interests
The authors declare no competing interests.

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